Okanogan and Wenatchee National Forests Roads Analysis: Naches Sub-Basin

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Introduction

Over the past decade, because of a national shift in environmental awareness, roads and road issues have become points of controversy. Roads are being scrutinized for their impact on ecosystems. Also, the funding available to maintain roads has decreased significantly. There is an urgent need to find a balance between the need for access and the potential environmental risks of a deteriorating road system. To meet this goal, the Okanogan and Wenatchee National Forests conducted a forest-wide road analysis.

This is the first of a 3-phase process to analyze all the roads on the forest. The second phase will be at the watershed scale, and the final phase is the project-specific scale. The first two pages will develop recommendations, and the final scale will be decision and implementation level.

The general opinion, based on comments from the public meetings and letters received to date, is that people want to see access maintained. They also want to see access for a variety of activities. Comments suggest that maintenance standards can be adjusted as long as access is not eliminated. Some comments were for a higher level of maintenance on certain roads and others stated they would like to see some roads gradually degraded to a lower maintenance standard. The common opinion is that continued access should be maintained. One comment emphasized consideration for disabled persons, another pointed out that access should not be limited to the "financially and physically elite," but should be available to all people.

The objective of the road analysis was "to provide line officers with critical information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions." (U.S.D.A. Forest Service, August 1999) This analysis is not a decision-making process. Strategies and recommendations developed with the analysis will be incorporated into future project-level decision-making analysis.

This analysis is a science-based interdisciplinary process based on existing information and inventories. The analysis addresses the effects of roads on biological, social and economic factors. The condition of the current road system will be compared to a desired condition, which includes amount and type of access as well as impacts and risks to the ecosystem. This comparison will identify opportunities and strategies for moving toward the goal of an affordable, efficient road system that meets the needs of the public and the agency with minimal impacts to the environment. The analysis will use previously completed plans, analyses and decisions.

This analysis is based on the objectives and guidelines in "Road Analysis: Informing Decisions about Managing the National Forest Transportation System," developed by the Forest Service Chief's Office in Washington, D.C. (U.S.D.A. Forest Service 1999). The guidelines present six steps that each analysis should complete. The six steps are:

Step 1: Setting up the analysis
Step 2: Describing the situation

Step 3: Identifying issues
Step 4: Assessing benefits, problems and risks
Step 5: Describing opportunities and setting priorities
Step 6: Reporting

The analysis of the Naches Sub-Basin is a modified version of a process developed by the Umpqua National Forest and presented in "Upper Steamboat Creek Watershed Analysis: Access and Travel Management Planning Process and Results." The process was modified to reflect characteristics and situations on the Okanogan Wenatchee National Forests, and will incorporate the six steps listed above.

This is the first of a three-phase process to analyze the roads on the forests. This first phase will analyze the arterials and collector roads. Approximately 80% of the annual maintenance budget is spent on these roads, even thought they account for approximately 30% of the miles on the district. The second phase will be at the watershed scale. The remainder of the roads will be analyzed in this phase. The final phase will be at a specific project scale, and all roads within the project area will be considered. The first two phases will develop recommendations, and are not decision documents. The final phase will be the decision and implementation level.

During the process input was requested from interested publics, cost share cooperators, state and federal agencies and tribal governments. The input was used during the analysis to verify issues, identify opportunities and build support for the process. The comments that were received are summaries in Appendix E. Approximately 20 responses were received, and 45 people attended the public information meeting.

The analysis process examines the major arterial and collector roads within the sub-basin. The roads were segmented according to their maintenance level and the watershed in which they are located. After the roads were segmented, they were rated on criteria in three modules: Human Use, Aquatics, and Wildlife. The Human Use module includes social, cultural, and economic criteria. The specific criteria in each module are described in the appendices. Each module developed a "High," "Moderate," or "Low" rating for each road segment. For the Aquatic and Wildlife modules the ratings refer to potential impact the roads have on the resources, for example a "high" rating equates to a high potential for resource impacts. However, for the Human Use module the ratings refer to the importance of the road in relation to the criteria. The three ratings were used to develop a recommended management strategy for that segment of road. The management strategy options ranged from major improvements to some form of decommissioning. In addition, each watershed within the sub-basin was given an overall rating for each module. This rating was used to develop the recommended priorities for order of conducting the watershed scale of the Roads Analysis process.

The Aquatic and Wildlife modules document the effects of roads on biological factors; the Human Use module addresses the effects of roads on the social and economical factors. The specific criteria in each module are described in the appendices; the five maintenance levels are described in Appendix X.

Each module developed a "High," "Moderate," or "Low" rating for each road segment. The three

ratings were used to develop a recommended management strategy for that road segment. The management strategy options ranged from major improvements to some form of decommissioning.

Each watershed within the sub-basins was given an overall rating for each module. This rating was used to develop the recommended priorities and sequence for conducting the watershed scale of the roads analysis process.

1. The compilation of all of all of the analyses will form the comprehensive forest wide road management strategy.
2. More detailed watershed scale analyses will tier to the sub-basin data and recommendations.
3. Scheduled forest plan revisions will utilize the results in setting long-term management direction for the road system across the forests. The revision is scheduled to be completed by 2006.

Naches Sub-Basin Analysis Area

This analysis focuses on the major arterials and collectors (roads opened and maintained for passenger car use) within the Naches River Sub-Basin. The sub-basin boundaries closely correspond to the boundaries of the Naches Ranger District on the Okanogan and Wenatchee National Forests (see Figure 1).

The Naches Sub-Basin is made up of seven watersheds: Tieton, Upper Tieton, Oak Creek, Rattlesnake, Bumping-American, Naches Main Stem, and Little Naches (see Figure 2). The area of the sub-basin being analyzed is 515,840 acres, of which 304,600 acres (59%) are in wilderness and inventoried roadless areas. The area contains approximately 1,550 miles of classified Forest Service Roads (FSRs) of which 450 miles were analyzed. Unclassified roads were not being considered in this analysis, but will be included in the future watershed scale analyses. The remainder of the system roads and known unclassified roads will be analyzed during the second phase of roads analysis which is scheduled for 2003-2004.

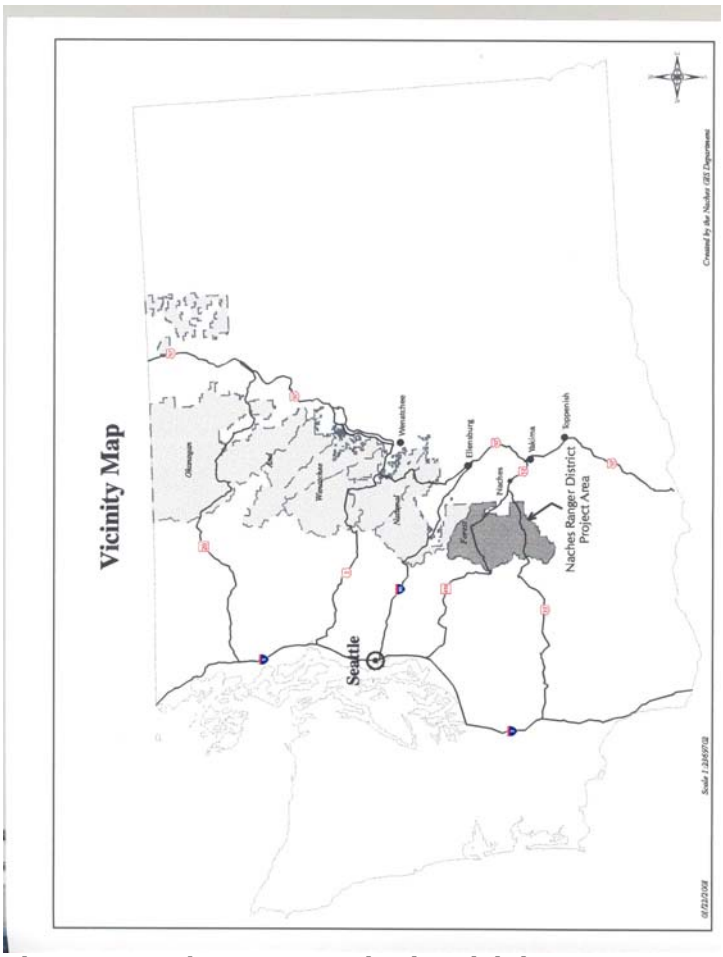

Figure 1. Naches Ranger District vicinity map

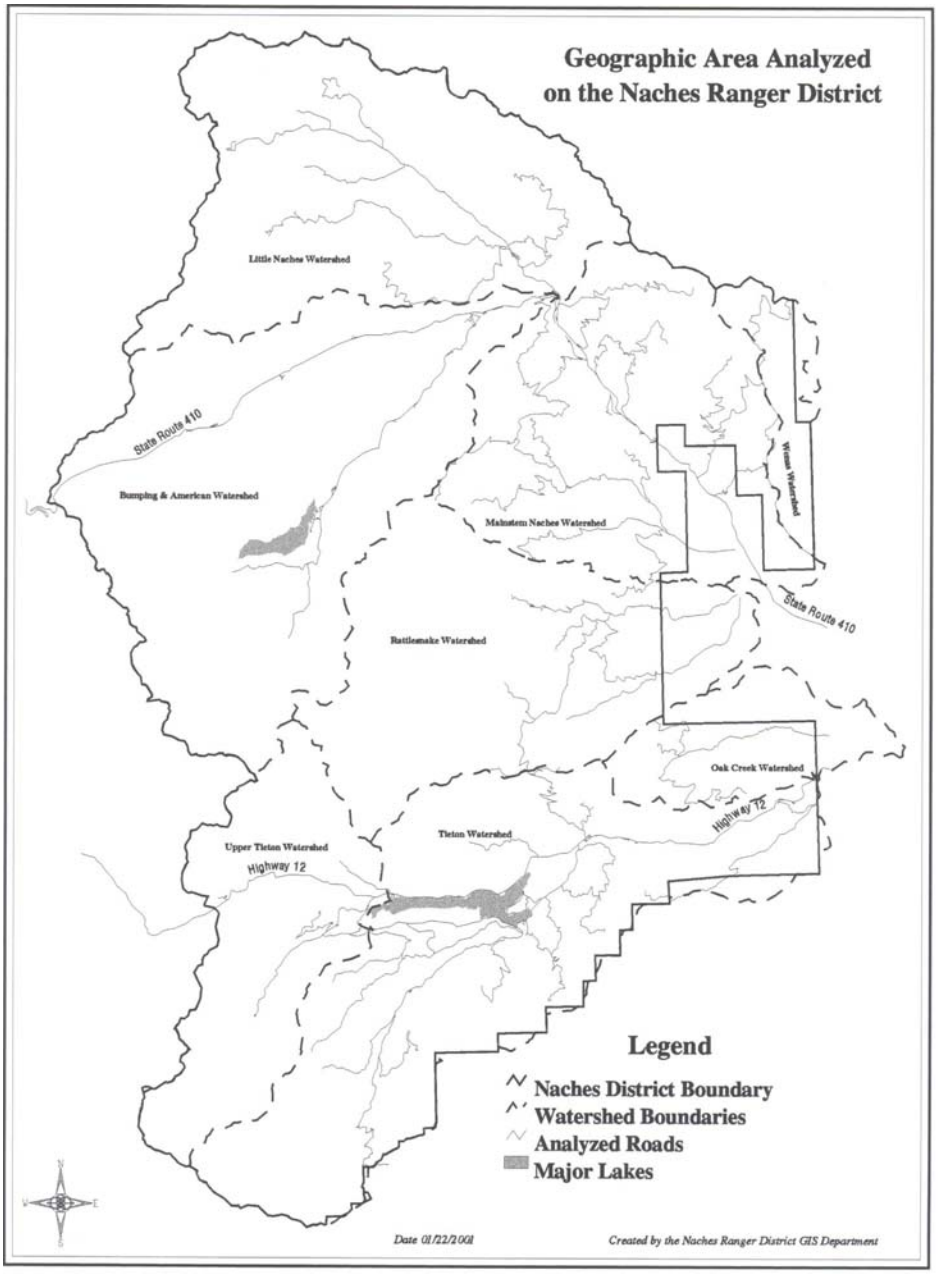

Figure 2. Geographic area analyzed on the Naches Ranger District

I. Existing Conditions and Situation

General Conditions

A. Roads

"At the start of the ethnographic period in the early 1800s, the eastern Cascades and adjacent foothills in the vicinity of Tieton and Naches Rivers were occupied by Sahpatin-speaking Kittitas Indians including the Lower Kittitas group known as the Yakamas. These groups are presumed to have used an established network of trails for access to summer camps. Summer camps were selected for their proximity to available plant and animal resources, so they were located in a variety of upland ridge and lowland riverine locations. There is ethnographic and archaeological evidence of trade between the Yakama and coastal Native American groups. Travel routes include what became the Naches Pass trail and the Cougar Valley trail, from Crow Creek over Raven's Roost to Silver Creek and down White River.

The entry of non-indigenous peoples to the Naches River Sub-Basin before the late 1800s was largely related to exploration and the fur trade. Travel was by foot or horseback and generally followed established native trails. By 1850, however, interest in developing an intermountain route linking eastern Washington with Puget Sound in the vicinity of Mount Rainier was being cultivated by railroad developers. Though plans to build a railroad through the mountains were eventually abandoned, interest in and work on a Naches Pass Road continued sporadically over the next century. By the mid-1850s, wagon trains of anxious settlers and prospectors crossed the mountains over the crude Naches road" (USDA FS 1994b).

Currently the Naches Ranger District has two major access routes: U.S. Highway 12 referred to as White Pass, and State Route 410 (S.R. 410) referred to as Chinook Pass. U.S. Hwy. 12 follows the Tieton River to Rimrock Lake and continues westward to White Pass. S.R. 410 follows Naches River and then the Bumping River up to the junction with the American River. From this junction, S.R. 410 takes an abrupt change in direction to the west to follow the American River on to Chinook Pass. These roads provide the main access into the heart of the Naches Ranger District and the beginning points of numerous forest roads. Many of the forest roads were originally built for timber and mineral extraction. In time, the demand for forest products increased, as did the need for additional roads. Equally as important as an economic element was the increasing interest in recreation and the recreation opportunities forest roads provided. These forest roads provide access for a multitude of recreation opportunities, resource and fire management activities, and to private lands and in-holdings. Among these recreation activities are trailheads, boating activities, developed campgrounds and dispersed camping sites, motorized recreation, including motorcycles, all-terrain vehicles (ATV's), and snow machines. Access to the area was increased by roads constructed by the public ("user-built roads") and termed "unclassified" by the U.S.D.A. Forest Service

Road-associated effects to the environment are also included in this road analysis. Throughout the sub-basin the combination of road location, road surface type, and high public use patterns during moist time of year, produce a higher potential for increased road damage and sediment production. This is particularly evident on the native surfaced roads that are popular during

hunting season, when, in many cases, use results in surface damage. To minimize the risks, yet provide access while considering that Forest and ecosystem management values and objectives are constantly changing, the management of these roads must also change. It is necessary to assure that each watershed has a road system to manage the resources and to meet public and agency needs with the minimum road related impacts to the environment. This roads analysis is a tool to describe opportunities for managing the District road system.

The Naches Ranger District has eight fifth-field watersheds with varying degrees of road access. The eight watersheds are: American, Bumping, Little Naches, Lower Tieton-Cowiche, Naches, Rattlesnake, Upper Tieton, and Wenas. The Cowiche and Wenas Watersheds are not included in the roads analysis because they are not included in the boundary of the Okanogan and Wenatchee National Forests. For the purposes of roads analysis for the Naches River Sub-Basin, the Forest Transportation Management System (INFRA Roads database) describes each system road or road segment by assigning values which describe the way the road services the resource management needs and the specific maintenance required consistent with management objectives and maintenance criteria. In the past few years the emphasis has been to gather road related data with projects such as the inventory and mapping of unclassified roads, identifying the backlog of deferred maintenance work, and surveying of road culverts which may be a problem for fish passage. Information provided by these other projects will be included at some level of the entire roads analysis process. A summary of the miles of Forest roads in each watershed by road type and maintenance level is available in the analysis file. The five maintenance levels are described in Appendix F.

In fiscal year 2000 just over $300,000 was expended on road maintenance in the Naches Sub-Basin. However, if all roads within the sub-basin were maintained to full standard the cost would be approximately $2,295,000, based on the Forest average annual per mile annual cost for each of the maintenance levels. Therefore, the Forest spent about 13% of the dollars needed to fully maintain all the sub basin roads to the standards described in Forest Service Handbook 7709.58. However, more than 13% of the roads received some amount of maintenance in an effort to provide the most maintenance possible.

It is anticipated that the $300,000 funding level will be fairly stable. A large increase or decrease in the maintenance budget is not anticipated. Therefore, this funding level will be used to help determine the “minimum affordable road system.” The minimum affordable road system is described as the miles of road within the analysis area that can be maintained to standard with the anticipated future funding. The minimum affordable system will be discussed in more detail in Part II.

B. Aquatics

The Naches Sub-Basin is tributary to the Yakima Basin. The Naches River drains into the Yakima River at Yakima, Washington. Fish species protected under the Endangered Species Act inhabiting the sub-basin are the mid-Columbia steelhead (threatened) and Columbia River bull trout (threatened). Other native salmonid species that are a management emphasis include spring chinook salmon, redband/rainbow trout, and west slope cutthroat trout. The Yakama Indian Nation and Washington Department of Fish and Wildlife are working to re-introduce coho salmon into the sub-basin. The term “at-risk” fish population, as used in this Roads Analysis,

refers to steelhead and bull trout populations as they are protected under the Endangered Species Act. The native salmonid species are found in all watersheds within the sub-basin. Anadromous salmonids however are no longer present in the upper Tieton watershed due to Rimrock Dam, which blocks access.

The Naches Sub-Basin is made up of eight watersheds: Naches, Little Naches, American, Bumping, Rattlesnake, Upper Tieton, Lower Tieton-Cowiche, and Wenas. The Cowiche and Wenas Watersheds are not included in the roads analysis because they are not included in the boundary of the Okanogan and Wenatchee National Forests.

Significant sub-watersheds for a species are as defined in MacDonald et al. (1996). The original mapping in MacDonald et al. (1996) has been updated periodically with new information, and as part of this project. Sub-watersheds are defined in MacDonald et al. (1996) as significant if they meet any one of the following criteria:

1. The sub-watershed was identified as a stronghold in the Interior Columbia Basin Ecosystem Management Plan Assessment.
2. The sub-watershed provides the primary spawning or rearing habitat for the species within the sub-basin.
3. The sub-watershed represents the only known occupied habitat within a 5th field watershed and is fairly isolated from populations in other watersheds, and thus is significant from a distribution standpoint.
4. The sub-watershed contributes to the genetic integrity of a species.
5. The sub-watershed is known, or strongly suspected, to support a stable, strong population.

For the roads analysis process only those sub-watersheds significant for steelhead or bull trout in the Naches Sub-Basin influence the ranking of a road segment because these two are threatened and therefore priority for consideration. The range of most the salmonid species greatly overlap and therefore road management activities that have a positive or negative impact on habitat for at risk species should, in general, have a similar effect on habitat for other native salmonids.

Current conditions are described and watershed scores developed using the following roads analysis rating factors (See the Aquatic Assessment):

1. Geologic hazard
2. Fine sediment
3. Floodplain function, off-channel habitat, and riparian reserves
4. Flow effects
5. At-risk fish populations

Because the Wetland and Wet Meadows rating factor is used only at the road segment level it is not discussed in the watershed condition section.

Section 7(a)(2) of the Endangered Species Act requires all federal agencies to review actions authorized, funded, or carried out by federal agencies to ensure such actions do not jeopardize the continued existence of listed species. Furthermore, federal agencies must consult with the National Marine Fisheries Service (pertaining to anadromous fish) and the U.S. Fish and

Wildlife Service (pertaining to inland fish) on on-going and new activities that may affect a listed species. The Okanogan and Wenatchee National Forests prepare biological assessments to assess potential impact of management activities. The biological assessments and subsequent consultation are conducted at the watershed scale. The basis for the biological assessment is "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale," prepared by U.S. Fish and Wildlife Service (adapted from the National Marine Fisheries Service), February 1998 (USDI FWS 1998).

An important portion of the biological assessment is establishing the environmental baseline for the watershed. In the baselines, various habitat and watershed features are rated as functioning appropriately, functioning at risk, or functioning at unacceptable risk. The fine sediment, floodplain function, off-channel habitat, riparian reserve, and flow effects ratings in the roads analysis are based on the latest watershed biological assessment for a watershed, which is cited at the beginning of each watershed section. When available, new information from monitoring was also used. The watershed score for each rating element is shown next to the element and the narrative gives the rationale for the score.

C. Wildlife

This part of the roads analysis is intended to describe the current conditions on the Naches Sub-basin in order to develop an information base upon which decisions can be made regarding the management of roads and their effect on wildlife. The sub-basin analysis will then identify the arterials and major collector roads for management, prioritize watersheds for further analysis at the watershed scale based upon potential restoration needs for wildlife habitats, identify issues within watersheds, and establish the context for watershed scale roads analysis.

Roads definitions are from the grizzly bear core analysis process and have been in use for wildlife analysis for several years. These analyses can be used to address wide-ranging carnivores, late-successional associated species, riparian-dependent species, ungulates, and unique habitats. Table 1 provides a summary of road-associated factors that affect wildlife habitats or populations (Wisdom et al. 1999). The analysis addresses the terrestrial wildlife (TW) roads analysis questions, TW (1), TW (2), TW (3), TW (4), and ecosystem functions (EF) question EF (2) identified in Appendix 1 of "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System" (FS-643, U.S.D.A. Forest Service 1999). The analysis described in this document is an adaptation of the TW questions to better address the issues and conditions on the Okanogan and Wenatchee National Forests.

The following discussion describes the five elements of the wildlife analysis and then presents specific descriptions of important aspects within each watershed in the Naches Sub-basin. The analysis criteria are discussed in Appendix C.

C1. Wide-Ranging Carnivores

Wide-ranging carnivores covered in this assessment that are known or suspected to occur within the sub-basin include the gray wolf (endangered), wolverine (petitioned for listing), and lynx (threatened). This sub-basin is located outside of the North Cascades Grizzly Bear Recovery

Zone. Several studies have documented the effects of road-associated factors on carnivores and these are summarized in Table 1. No conservation strategies or recovery plans currently exist for wolverine or gray wolves. A conservation strategy for lynx has been completed (Ruediger et al. 2000) but does not address potential indirect effects of roads on habitat quality. For all of these species, areas that are relatively free of human access provide refugium that is important for their long-term viability (Weaver et al. 1996). The availability of these areas is based on the amount of core area using the assessment process and definitions provided in Puchlerz and Servheen (1998).

C2. Late-Successional Associated Wildlife Species

There are over 100 wildlife species on the Okanogan and Wenatchee National Forests associated with late-successional forest (USDA FS 1997c). The road-associated factors that have been identified to affect these species are shown in Table 1. These species include the northern spotted owl (Threatened) and are managed through a network of late-successional reserves (LSRs) and managed late-successional areas (MLSAs) (USDA FS1994a). The Okanogan and Wenatchee National Forests Late-Successional Reserve Assessment (USDA FS 1997c) identified a goal of providing a "high" level of habitat effectiveness within LSR's and MLSAs. A "high" level of habitat effectiveness was defined as open road densities <1 mile/square mile of habitat and >70% security habitat (areas >500 m from an open road or motorized trail).

C3. Riparian Dependent Wildlife Species

This group of wildlife species includes about 285 vertebrate species that are either directly dependent on riparian habitat or use these habitats far more than others (Thomas et al. 1979). Current management direction includes managing riparian areas and influences zones through a network of riparian reserves (USDA FS 1994a). Riparian Reserves provide habitat for wildlife species and are also important in providing habitat connectivity between areas managed for late-successional habitats. The road-associated factors that can affect riparian-dependent wildlife species are summarized in Table 1.

Table 1. Road-associated factors that negatively affect habitat or populations of wildlife species (based on Wisdom et al. 1999) and the wildlife species group for which effects of the road-associated factor has been documented

Road-associated factor	Effect of the factor	Wildlife group affected
Hunting	Non-sustainable or non-desired legal harvest by hunting facilitated by road access.	Wide-ranging carnivores; Ungulates
Poaching	Increased illegal take of animals, as facilitated by roads.	Wide-ranging carnivores; Ungulates
Collisions	Death or injury resulting from a motorized vehicle running over or hitting an animal	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique habitats
Chronic negative human interactions	Increased mortality of animals (e.g. euthanasia or shooting) due to	Wide-ranging carnivores

Road-associated factor	Effect of the factor	Wildlife group affected
	increased contact with humans, as facilitated by road access.	
Movement barrier	Interference with dispersal or other movements as posed by a road itself or by human activities on or near a road or road network.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique habitats
Displacement or avoidance	Spatial shifts in populations or individual animals away from a road or road network in relation to human activities on or near a road or road network.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique habitats
Habitat loss and fragmentation	Loss and resulting fragmentation of habitat due to the establishment of roads, road networks, and associated human activities.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique habitats

C4. Ungulates

These species include mule deer, elk, mountain goats, and California bighorn sheep. Current management is focused on maintaining or restoring habitat effectiveness within areas designated as winter range (forest plan allocation EW-1). The road-associated factors that affect these species are summarized in Table 1. An important issue addressed in this assessment is the access that roads provide on winter ranges for snowmobiling and other winter activities. Winter is an important time for ungulates because food resources are limited and energy reserves are at or below maintenance levels (McCorquodale 1991). This assessment was based on the assumption that the road density on the winter ranges provides an index to the amount of winter human activity occurring. Should discrepancies exist between forest plan mapped winter range and actual winter range, this portion of the analysis will be conducted based on actual winter range.

C5. Unique Habitats

Unique habitats include wetlands, talus slopes, caves, cliffs, snag patches, hardwood forests, meadows, etc., which provide important habitat for a wide variety of wildlife species. Unique habitats such as wetlands have special protection under the Northwest Forest Plan (USDA FS 1994) and are managed by retaining buffers around them. Other unique habitats are managed on a site-specific basis through project design. Table 1 summarizes the road-associated factors that can affect unique habitats.

Tieton Watershed

Primary access to the Tieton Watershed is from the east and west via U.S. Highway 12 (White Pass Highway). Numerous low or non-maintained private and Department of Natural Resources roads provide limited access to the watershed from the south over Jumpoff and Divide Ridges. Road 1070 (Layman Road) enters the southwest corner of the watershed from the Yakama Indian

Reservation. Access from the north is provided by Forest Service Road 1500 (Bethel Ridge). The Tieton Emergency Airstrip, which is patented land of the Washington State Department of Transportation Aeronautics Division, provides access by aircraft.

The Tieton Watershed has 317 miles of forest roads of which 109 miles or 34% are considered in this analysis, 166.3 miles having aggregate or gravel surface and 126.05 miles having native surface. There are also 3.95 miles of private road and 19.73 miles of U.S. Hwy. 12, totaling 340.68 miles of developed road. There are 60 miles of four-wheel drive trails, 56 miles of single tread motorized trails and approximately nine miles of identified user built, single tread motorized trails, not officially on the trail system. For winter recreation there are 45 miles of groomed snowmobile trails on existing road trail location.

The construction of all the roads in the Tieton Watershed was funded by timber harvest activities. Some roads and road segments are cost-shared. Road 1000 (South Fork Tieton), Road 1201 (Lost Lake), Road 1306 (Wildcat), and Road 1500 (Bethel Ridge) are all single-lane roads with turnouts and are maintained to level 3 standards, accessible to passenger cars.

Road 1200 (Tieton Road) is the only Forest road that is an arterial road within the watershed. It is a double lane, long term, constant service road with asphalt surface. It is maintained by Yakima County to level 5 standards (accessible to passenger cars with comfort). Other significant roads within the watershed include:

Road 1202 (Spencer Creek)
Road 1203 (Fish Creek)
Road 1204 (Bear Creek Mountain)
Road 1205 (Pine Grass)
Road 1010 (Short and Dirty)
Road 1040 (Corral Creek)
Road 1050 (Discovery Creek)
Road 1070 (Layman Road)

These are classified as local roads with maintenance level 2 and level 3 standards. These roads are very popular with the motorized recreating public as travel routes for scenic and pleasure driving as well as access to dispersed recreation sites and trails.

Road 1301 (Bear Canyon) and 1302 (Jumpoff) are also located in the watershed. These two roads along with some of their spurs are share cost roads and managed in cooperation with Plum Creek Timber Company. Because these roads are not on Forest Service land easements for these roads have been exchanged with the Forest Service to ensure public access. These are long term, constant service roads. They are single lane roads with turnouts and have native surface. Maintenance varies on these road systems.

With the exception of the roads adjacent to Rimrock Lake, approximately 60 to 70 percent of the road use occurs during the fall and early winter. The primary activities of the motoring public are hunting and wood gathering with some pleasure driving. Road use around Rimrock Lake remains constant throughout the recreational season with primary activities being camping and water sports. Past road use surveys showed a dramatic increase in public use of forest roads in mid-October and a sharp decline by mid-November. However, changing hunting seasons have

produced more gradual increases and decreases in use patterns and extended the length of time the public is using the roads.

A. Human Use

A1. Public Use

There are a number of permitted developments on the National Forest including 255 recreation residents in the watershed, an organization camp, and outfitter/guides. These permittees also depend on National Forest system roads for access.

The upper Tieton is within two hours of Seattle and one hour of Yakima, which make it convenient for recreationists. Four distinct seasons allow for all kinds of recreation opportunities. (Tieton Watershed Analysis) (USDA FS 1996). Driving for pleasure is the single most popular recreational activity, but this watershed lends itself to a great variety of other outdoor activities. The watershed contains over 56 miles of single tread trails, over 60 miles of off-highway vehicle (OHV) four wheel driveways, and over 500 dispersed camping sites in this watershed. Rimrock Lake is a destination for water related activities. There are cross-country ski trails and snowmobile trails for winter visitors. The watershed is also popular for activities that are not associated with developed facilities, such as wood gathering, wildlife viewing, sightseeing, hunting, and many other outdoor activities. The variety of geologic features, elevation changes, and vegetative diversity offer many unique settings and provide many opportunities for people whether they are seeking a relaxing or a challenging experience.

Businesses from the summit of White Pass to the community of Naches depend on the revenue generated by use of the public lands in the watershed. The four seasons use lends a degree of stability to local businesses. Though there is a distinct shift in the types of activities, there is flow of visitors into this area during each of the four seasons.

Commodities of significance in the Tieton Watershed include timber, posts and poles, beargrass, boughs, Christmas trees, mushrooms, firewood, tree transplants, and grazing. Water is a commodity that comes from the upper Tieton Watershed and is stored in Rimrock Lake for use on thousands of acres of orchards to the east in the Tieton division of the Yakima Project" (Tieton Watershed Analysis) (USDA FS 1996).

A2. Resource Management

Within the Tieton Watershed the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately 26 percent is occupied by dry forest vegetation (low fire regime) dominated by the Oregon white oak, Douglas-fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south, west and east aspects, with approximately 78 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir and western hemlock plant series. These communities comprise approximately 23 percent of the watershed; 64 percent is overstocked. Upper elevations, which includes 27 percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of a combination of the subalpine fir, Pacific

silver fir, mountain hemlock, and whitebark pine series. Approximately 11 percent of these communities are in an overstocked condition. The remaining 24 percent of the area is comprised of non-forest vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Tieton Watershed consists of that portion of the Tieton watershed that drains downstream of Rimrock Reservoir. Approximately 20% of the watershed is private land. Human uses have heavily affected the Tieton. U.S. Highway 12 borders much of the mainstem and the dam has blocked migratory fish access to the upper watershed. Anadromous fish (and resident trout) habitat and populations are also affected by an altered flow regime below Rimrock Lake. The flow regime out of Rimrock has been designed to protect spring chinook spawning in the upper Yakima River while providing irrigation water to the Yakima Valley. The resulting Tieton River flows have been flip-flopped from the natural flow regime. During spring run-off water is withheld in Rimrock Lake while most irrigation flows are released from the upper Yakima River reservoirs. In late summer, flow is stored in the upper Yakima and released from Rimrock Lake. This “flip-flop" helps protect spring chinook redds in the upper Yakima but results in poor fish habitat conditions in the Tieton. Sub-watersheds include Lower Tieton, Middle Tieton, Oak, and Wildcat.

Existing habitat conditions were obtained from the most recent environmental baseline established in “Fisheries Biological Evaluation, On-Going Activities Lower Tieton Watershed June 3, 1998” (USDA FS 1998d). Significant sub-watersheds are from maps updated as part of the roads analysis project using the most recent District fish distribution and status information. The Cowiche portion is not discussed because the watershed is not within the National Forest.

B1. Geologic Hazard

The Tieton Watershed is within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are composed predominately of thick basalt flows, tertiary volcanics, and pyroclastic flows. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that have influenced landscape development includes alpine glaciations, fluvial down cutting, and mass wasting and structural features in the mid and lower portion of the watershed.

The alpine glacial processes in the Tieton Watershed have produced steep U-shaped glacial trough landforms. These glacial troughs are limited to the upper slopes of the South Fork of the Tieton. Within this area, glacial troughs total 2,124 acres and are covered with varying thicknesses of glacial till. A diagnostic feature of these troughs is the dense pattern of parallel first order drainages. Shallow landslides (debris flows) are a significant source of sediment delivery and often originate from these first-order drainages along the interface between glacial till deposits and scoured bedrock. These debris flows have deposited numerous debris fans in the valley floor. As these fans coalesce they cause stream confinement and streams become bounded by alluvial fans altering stream alignment and gradient. Debris fans can deliver sediment directly

into stream systems but a more important sediment delivery mechanism is the degree of stream scour along the margins as streams adjust to the confinement. The generated sediment from these shallow landslides (debris flows) has variable textures but a fair amount is coarse textured.

Deep-seated landslides can be small or very large depending upon the localized conditions. These deep-seated landslides were stratified during the watershed analysis procedures. Approximately 8,247 acres of small isolated deep-seated landslides occur throughout the watershed and another 11,668 acres of large deep-seated landslides occur within the watershed. These deep-seated landslides occur in Spencer, Fish, Soup, and Pine Creeks of the mid section of the Tieton Watershed. Occasionally these landslides have slid in to the valley floor creating old impoundments, widening valleys, confining stream systems, and creating wet meadows. The affect of this interaction between landslides and stream confinement is a significant source of sediment delivery. When landslides block stream channels, additional sediment is associated with the affect of streams attempting to readjust to confinement. Streams continue to readjust to this confinement by

Down cutting through the toe of many landslides.
Shifting alignment and undercutting confining toe slopes creating V-notched inner gorges.
Shifting base level and eroding channel beds immediately downstream of local confinement, (related to rocky slide debris).
Undermining the toe of landslides creating unstable slope conditions and triggering additional failure into the channel perpetuating the process.

During this stream adjustment accelerated levels of sediment are being routed and delivered due to the initial landslide blocking channels.

Table 2. Tieton Watershed total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom mainstem stream channels
25.6	7.67	25.0	6.46

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by

Contributing to slope instability.
Concentrating runoff and increasing erosion.
Causing confinement of channels forcing streams to erode channels and banks.

B2. Fine Sediment (Score 6)

There is no quantitative sediment data for the Tieton. Based on stream surveys and the Tieton Watershed Analysis, only the Oak Creek sub-watershed is judged to be functioning appropriately for Fine Sediment. Soup Creek is functioning at unacceptable risk due to ungulate grazing (cattle and elk), past riparian timber harvest and associated landings. The lower Tieton River itself is

functioning at unacceptable risk due to a loss of gravel and sediment recruitment due to the dam and loss of channel complexity. Milk Creek is functioning at risk due to sensitive soils, channel confinement by the 1200 road. Accelerated channel down cutting and accelerated sediment delivery may be the result of the confinement due to the road, road construction, timber harvest and loss of beaver. Road condition surveys have been conducted on four miles of road, of which all four miles were judged to be sediment sources due to potential for surface erosion reaching stream channels or unstable road prisms. Other tributaries are judged to be functioning at risk.

B3. Plain Flood Function, Off-Channel Habitat, and Riparian Reserves (Score 10)

Flood plain function along the main stem Tieton is functioning at unacceptable risk due to channelization, roads, campgrounds, and other human influences. Soup and Milk Creeks have also diminished flood plain function due to ungulate grazing, and other management activities. Dispersed recreation may be contributing to the diminished flood plan function. Oak Creek is functioning at risk due to the 1400 road but road decommissioning has helped improve the situation. Flood plain connectivity is functioning appropriately for the other tributaries.

Off-channel habitat along the main stem Tieton is functioning at unacceptable risk due to channel confinement and loss of historical off-channel habitat due to construction of U.S. Hwy 12. Oak Creek is functioning at risk due to confinement of the 1400 road. Road decommissioning has improved the situation. Soup and Milk Creeks are also functioning at risk. Other tributary watersheds are functioning appropriately.

Overall riparian reserves are functioning at unacceptable risk in the Tieton Watershed. Although the riparian reserves in upper Wildcat, Hause, and portions of Jumpoff Creeks are felt to be in good condition, roads, timber harvest, ungulate grazing, and recreation sites have altered much of the reserves throughout the watershed. U.S. Hwy. 12 occupies much of the lower Tieton River Riparian Reserve on the north bank. The stream has been confined and straightened to accommodate the highway with a loss of adjacent wetland and off-channel habitat.

B4. Flow Effects (Score 6)

Wildcat and Lower Tieton Sub-Watersheds are functioning at risk with road densities between 1.0 and 2.4-miles/square mile. U.S. Hwy. 12 is located within the Riparian Reserve for most of the Lower Tieton between the confluence with the Naches River and Rimrock Lake. A large slope adjacent to Wildcat Creek (road 1306) has a large cut-bank, which is a chronic source of sediment. Middle Tieton and Oak Creek Sub-Watersheds are functioning at an unacceptable risk.

The Tieton River is functioning at unacceptable risk for peak/base flows due to the regulated flow regime. Tributary drainages other than Soup Creek are functioning appropriately for flows. Soup Creek is functioning at risk as base flows appear to be diminishing.

B5. At-Risk Fish Populations (Score 1)

Bull trout and steelhead are found in the Tieton, but habitat has been greatly altered due to the altered flow regime, channelization, and loss of habitat complexity. Spawning and rearing is felt to be minimal if there is any at all in the mainstem Tieton. Steelhead may spawn and rear in

tributaries such as Wildcat and Oak Creek. Adult bull trout have been observed in the main stem, but other than in Creek, no bull trout have been found in tributaries. A lone bull trout was observed in Oak Creek in 1999. There are no significant sub-watersheds for steelhead or bull trout. Of note, Oak and Wildcat Creeks are significant for west lope cutthroat trout due to the presence of pure or essentially pure populations.

C. Wildlife

The Tieton Watershed provides high-level human use with access to numerous trailheads and wilderness. This watershed has high potential for improvement as the current habitat conditions are unsatisfactory. Note that in this discussion, numbers presented in (%) are a percentage of the corresponding watershed acreage.

C1. Wide-Ranging Carnivores

The open road density in the Tieton Watershed is moderate at 1.54 mi/mi^2. Approximately 47.1% of the watershed is core habitat, for a total of 54,260 acres. The open road density in the two Lynx Analysis Units (LAUs), Bethel and South Fork Tieton, is 1.05 mi/mi^2. There are 118.84 miles of open road in the LAUs.

C2. Late-Successional Associated Wildlife Species

The three LSR/MLSAs in the Tieton Watershed--Tieton LSR, Lost Lake MLSA, and Russell Ridge MLSA--cover approximately 18,135 acres (15.7%). The security habitat and habitat effectiveness ratings are low for all three.

C3. Riparian Dependent Wildlife Species

Riparian reserves occupy approximately 16,914 acres (14.7%) of the Tieton Watershed. The open road density within the riparian reserves is high, 2.801 mi/mi^2.

C4. Ungulates

The Tieton Watershed contains 7,200 acres (6.2%) of winter range with a high open road density of 2.33 mi/mi^2. This watershed also contains areas important for migration, fawning and calving. California bighorn sheep use the area for summer and winter range.

C5. Unique Habitats

Unique habitats are very diverse and abundant in the Tieton Watershed, covering 27,749 acres (24.2%). Table 3 provides a summary of the availability of unique habitats in the Tieton Watershed.

Table 3. Availability of unique habitats in the Tieton Watershed

Unique habitat	Acres	% of watershed
Avalanche	59	0.05
Blue Slide PGA	225	0.2
Cave	1	<0.01

Unique habitat	Acres	% of watershed
Glacial Cirques	895	0.8
Glacier	193	0.2
Goose Egg PGA	523	0.5
Grassland	1,084	0.9
Hardwood	15	0.01
Kloochman PGA	308	0.3
Landslide	307	0.3
Lithosol	815	0.7
Meadow	1,575	1.4
Whitebark Pine	1,848	1.6
Pioneer	41	0.04
QUGA	281	0.2
Rock	13,715	11.9
Shrubland	4,822	4.2
Snowfield	78	0.07
Wetland	964	0.8

Upper Tieton Watershed

Primary access to the Upper Tieton Watershed is by way of U.S. Highway 12 (White Pass). Access by foot to the watershed is provided from the Pacific Crest Trail.

Two wilderness areas, the William O. Douglas, north of U.S. Hwy. 12, and Goat Rocks, located south of U.S. Hwy. 12, dominate the total area of the watershed. Travel through the wilderness portions of the watershed is by foot or horseback only. Seven trailheads within the watershed provide entry points into the backcountry. The trailheads in the watershed are: Indian Creek, Sand Ridge, Dog Lake, White Pass North and South, Round Mountain, and North Fork Tieton River, commonly called Scatter Creek.

The transportation system in the Upper Tieton Watershed has approximately 38 miles of Forest Service System roads, eight miles of U.S. Highway 12, 70 miles of foot or pack and saddle trails and 15 miles of cross-country ski trail. Approximately 16 miles or 42% will be considered in this analysis. There is also 10 miles of unclassified road with in the watershed, mainly accessing disbursed campsites. Four established heliports are located in the watershed, three of which are located in the Wilderness. About two-thirds of the Forest Service roads in the watershed were built for the purpose of harvesting timber. The remaining roads were constructed to access mining claims, the U.S. Department of Interior, Bureau of Reclamation's (BOR) dam construction at Clear Lake, fire detection and suppression, or for recreational purposes, such as summer homes.

Forest Service road 1200 provides access to the majority of the southern portion of the Upper Tieton Watershed. It is an arterial facility and is maintained to a level 5 standards (assessable to passenger cars with comfort) by Yakima County. Two significant roads originate on road 1200.

Road 1200740 accesses the heavily used Clear Lake Campground and the North Fork Tieton River road 1207 provides primary horseback access to the Goat Rocks Wilderness. Road 1308 originates on U.S. Hwy.12 and provides access to Indian Creek trailhead. It is maintained to Level 3 standards. This trailhead, along with the White Pass North trailhead, provides the primary foot and horseback access to Mosquito Valley and Rattlesnake Peaks in the William O. Douglas Wilderness.

A. Human Use

A1. Public Use

The primary use of this watershed is recreation. Recreation use is extremely high in the center of the watershed (near the primary roads); use is year round, and the types of recreation use are extremely varied throughout the watershed. Unique qualities of the Upper Tieton Watershed that draw people to the area and influence the recreation experience include the large percentage of the watershed designated as the William O. Douglas and Goat Rocks Wildernesses; the variety of topographic features (lakes and mountains) desirable for different types of recreation and scenic viewing; the close proximity of the Seattle-Tacoma metropolitan area (within two hours); and the easy access to high use destination areas provided by U.S. Highway 12.

U.S. Highway 12 bisects this watershed and is the main travel route. Many people on this highway come from different areas of the state or nation and are merely moving through the area to nationally known destinations such as Mt. Rainier National Park or Mt. St. Helen's National Volcanic Monument. For many others this watershed is a destination. U.S. Highway 12 provides direct access to a variety of recreation opportunities in the watershed, including the White Pass Ski Area, the Pacific Crest Trail, 86 recreation residences in three tracts, three developed campgrounds, several dispersed camping areas, an outfitter-guide base area, three wilderness trailheads, and one patented mineral claim.

The Tieton and Clear Lake arterial roads provide access to several small developed campgrounds, dispersed campsites, a developed day use area, two boat launches, four organization camps, and a 15 mile cross country ski trail system. The North Fork Tieton, Round Mountain, and Indian Creek roads provide access to more primitive opportunities, including dispersed camping, and three Wilderness trailheads. Power line access and a building stone source are under Special Use Permit.

Driving for pleasure is the highest use recreation activity in the watershed, occurring primarily on U.S. Highway 12, Tieton Road, and Clear Lake Road. U.S. Highway 12 is a designated State Scenic Byway. There are approximately 90 dispersed campsites throughout the watershed outside the wilderness boundary. There are 70 miles of system pack and saddle trail (all within or leading to the wilderness areas) within the watershed.

This watershed differs from much of the rest of the Naches Sub-Basin in the absence of system four-wheel driveways and overall low amount of off-road four-wheel drive use and absence of groomed snowmobile routes and snow-parks.

A commodity of significance in the Upper Tieton Watershed is the water stored in Clear Lake

and Rimrock Reservoir. Approximately two-thirds of the Forest Service roads in the watershed were built for harvesting timber. Today, only a small amount of timber is removed from the watershed. The remaining roads were constructed to access mining claims, BOR facilities at Clear Lake, fire detection and suppression, or for recreational purposes. Firewood cutting is closed in this watershed.

A2. Resource Management

Within the Upper Tieton Watershed the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately six percent is occupied by dry forest vegetation (low fire regime) dominated by the Douglas-fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south aspects, with approximately 82 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir and western hemlock plant series. These communities comprise approximately 17 percent of the watershed, with 46 percent being overstocked. Upper elevations, which comprise 48 percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of a combination of the subalpine fir, Pacific silver fir, mountain hemlock, and whitebark pine series. Approximately one percent of these communities are in an overstocked condition. The remaining 29 percent of the area is comprised of non-forest vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Tieton River is a tributary to the Naches River, entering the Naches west of the town of Naches. Historically the Tieton River drainage supported spring Chinook salmon, summer steelhead, coho salmon, bull trout, redband/rainbow trout, and west slope cutthroat trout. Construction of Rimrock Dam by the Bureau of Reclamation in 1924 permanently blocked anadromous fish access to the Upper Tieton Watershed and isolated fish populations, including migratory bull trout above the dam. The Upper Tieton Watershed drains into Rimrock Lake. Sub-watersheds include Rimrock Lake, Indian, Clear, lower North Fork Tieton, headwaters North Fork Tieton, lower South Fork Tieton, headwaters South Fork Tieton, and Fish-Spencer-Short and Dirty.

Existing habitat conditions were obtained from the most recent environmental baseline established in “Fisheries Biological Evaluation, On-Going Activities Upper Tieton Watershed June 11,1998” (USFS 1998e). Significant subwatersheds are from maps updated as part of the roads analysis project using the most recent District fish distribution and status information.

B1. Geologic Hazard

The Upper Tieton Watershed is within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are made up predominately of thick basalt flows, tertiary volcanics, and pyroclastic flows. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that have influenced landscape development includes alpine glaciations in the upper watersheds and fluvial down cutting along with mass

wasting and structural features in the mid and lower portion of the watershed.

The alpine glacial process in the Upper Tieton Watershed has produced steep U-shaped glacial trough landforms. These glacial troughs all occur within the Goat Rocks Wilderness Area. Within this area glacial troughs total 31,266 acres and are covered with varying thicknesses of glacial till. A diagnostic feature of these troughs is the dense pattern of parallel first-order drainages. Shallow landslides (debris flows) are a significant source of sediment delivery and often originate from these first-order drainages along the interface between glacial till deposits and scoured bedrock. These debris flows have deposited numerous debris fans in the valley floor. As these fans coalesce, they cause stream confinement and streams become bounded by alluvial fans altering stream alignment and gradient. Debris fans can deliver sediment directly into stream systems but a more important sediment delivery mechanism is the degree of stream scour along the margins as streams adjust to the confinement. The generated sediment from these shallow landslides (debris flows) has variable textures, but a fair amount is coarse textured.

Locally deep seated but small collapsed till deposits total 19,036 acres in the Upper Tieton Watershed. The secondary mass wasting processes have been extensive enough to modify the initial glacial trough landforms. Occasionally these landslides have slid in to the valley floor creating old impoundments, widening valleys, confining stream systems, and creating wet meadows. The affect of this interaction between landslides and stream confinement is a significant source of sediment delivery.

Once slides block stream channels, additional sediment is associated with the affect of streams attempting to readjust to confinement. Streams continue to readjust to this confinement by:

- Down cutting through the toe of many landslides.
- Shifting alignment and undercutting confining toe slopes creating V-notched inner gorges.
- Shifting base level and eroding channel beds immediately downstream of local confinement, (related to rocky slide debris).
- Undermining the toe of landslides creating unstable slope conditions and triggering additional failure into the channel perpetuating the process.

During this stream adjustment accelerated levels of sediment are being routed and delivered due to the initial landslide blocking channels.

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by

- Contributing to slope instability.
- Concentrating runoff and increasing erosion.
- Causing confinement of channels forcing streams to erode channels and banks.

Table 4. Upper Tieton Watershed total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom mainstem stream channels
---	5.0	10.3	3.2

B2. Fine Sediment (Score 6)

Although no qualitative sediment data was available, the Upper Tieton was considered to be functioning at risk due to fill slope failures, dispersed campsites and overgrazed meadows. These all appeared to be chronic sources of fine sediment. Roads, including the 1040, 1050 and 1070 were also considered to be sediment sources. Restoration work focusing on improving grazing practices, rehabilitating meadows, reducing impacts to riparian habitat from dispersed camping and reducing erosion from trails has been implemented in the watershed. Results of McNeil core sampling (McNeil 1960) on the South Fork Tieton near Minnie Meadows in 1999 showed fine sediment in gravel to be low, 9.8%. The watershed is rated as a 6 for fine sediment since there still are some trail problems and dispersed recreation problems, primarily because the 1040 and 1050 roads cross slide-prone areas directly upstream or adjacent to bull trout spawning areas and may present substantial risk of mass failure.

B3. Flood Plain Function, Off-Channel Habitat, and Riparian Reserves (Score 9)

Flood plain function and riparian reserves are rated as functioning appropriately, with the area around the reservoir rated functioning at unacceptable risk for flood plain function due to the effects of reservoir on the draw down zone. Riparian reserves were rated as functioning appropriately except for the Rimrock Lake Sub-Watershed due to the draw down zone and lower South Fork Tieton. The primary reason for the at-risk rating was grazing and dispersed recreation particularly in meadows along the South Fork Tieton River. Management actions have been implemented to reduce the impact of dispersed recreation and grazing but the concern remains at present therefore the Upper Tieton is scored as a 9.

B4. Flow Effects (Score 6)

Indian, Clear, and North Fork Tieton are considered to be functioning appropriately for flows and road densities. The lower South Fork, lower North Fork, and Fish-Spencer-Short and Dirty Sub-Watersheds are considered at risk for road density. There is also some evidence of potential change in peak flow timing in the South Fork Tieton; therefore the Upper Tieton Watershed is scored as a 6 with emphasis on the South Fork Tieton and tributaries.

B5. At-Risk Fish Populations (Score 9)

Anadromous fish access to the watershed is blocked due to Rimrock Dam. Indian and lower

South Fork Tieton are significant for bull trout as is Rimrock Lake Sub-Watersheds. Rimrock Lake provides adult habitat for the fluvial bull trout population while Indian Creek and the South Fork Tieton provide the spawning habitat for an apparent strong population. The watershed offers refugia for bull trout in the Naches Sub-Basin although isolation and brook trout presence are a concern. Restoration and protection should be a priority therefore the watershed is scored as a 9.

C. Wildlife

C1. Wide-Ranging Carnivores

The open road density in the Upper Tieton Watershed is low at 0.55 mi/mi^2. Approximately 81.5% of the watershed is core, for a total of 42,541 acres. There are two LAUs in the Upper Tieton Watershed: Bethel and South Fork Tieton. The open road density in the LAUs is low as well, at 0.35 mi/mi^2, and they contain only 10.84 miles of open road.

C2. Late-Successional Associated Wildlife Species

A small portion of the Tieton LSR, consisting of 2,207 acres (4.2% of UTW) is in the Upper Tieton Watershed. The security habitat and habitat effectiveness of this part of the LSR are still low.

C3. Riparian Dependent Wildlife Species

Riparian reserves occupy approximately 8,350 acres (16.0%) of the Upper Tieton Watershed. The open road density within the riparian reserves is 1.05 mi/mi^2.

C4. Ungulates

The Upper Tieton Watershed is a site of migration, fawning and calving areas for ungulates. This is also an important, although unmapped, winter range location for mountain goats.

Table 5. Availability of unique habitats in the Upper Tieton Watershed

Unique habitat	Acres	% of watershed
Avalanche	591	1.1
Glacial Cirques	131	0.3
Glacier	246	0.5
Grassland	219	0.4
Landslide	33	0.06
Meadow	374	0.7
Parkland	1,903	3.6
Whitebark Pine	75	0.1
Rock	9,795	18.8
Snowfield	363	0.7
Wetland	1,140	2.2

C5. Unique Habitats

Unique habitats are diverse and abundant in the Upper Tieton Watershed, covering 14,870 acres (28.5%). Table 5 provides a summary of availability:

Oak Creek Watershed

The Oak Creek Watershed transportation system consists of 67.22 miles of National Forest roads of which 24 miles or 36% will be considered in this analysis and 25.63 miles of State and Private roads. 33 miles have aggregate or gravel surface with the remainder having a native surface. Approximately 90% of the roads are located within the non-forest and dry-forest vegetation groups.

There are also 8.5 miles of OHV trails and 2.56 miles of non-motorized trails. Primary access to the watershed is normally provided by road 1400 (Oak Creek), which originates at U.S. Hwy. 12. There are no system pack and saddle trails or groomed snowmobile trails located in the watershed.

The watershed is served by three main road systems. Road 1400 (Oak Creek) is maintained to Level 3; (accessible to passenger cars) road 1401 (South Fork Oak Creek) and road 1410 (Elk Ridge) are all maintained to Level 2, maintained for high clearance vehicles. These three roads along with some of their spurs are cost share roads and are managed in cooperation with Plum Creek Timber Company. Easements for these roads have been exchanged with the Forest Service. Eighteen roads for a total of 36.12 miles are under agreement. Easements for road 1400 have also been exchanged with the Washington State Department of Natural Resources and Washington State Department of Game.

Road 1301 (Bear Canyon) is divided into two traveled segments. A 1980 flood destroyed a 2.63-mile segment of road in the middle and it was not rebuilt. The first segment originates at U.S. Hwy.12 and is 0.42 miles long. The second segment begins at Mile Point 3.05 and ties into the 1401 road system. The Forest Service currently does not plan to rebuild the middle segment. It is now being used as a trail and continues to be accessed from U.S. Hwy. 12. Easements and cost share agreements still exist for the entire road so it continues to be tracked as a road on the Forest Transportation System.

The construction of virtually all of the roads within the Oak Creek Watershed was funded by timber harvest activities. Cattle and elk grazing were the primary watershed uses until the late 1950s when timber harvest increased within the watershed and at that point road construction increased also.

Approximately 70 to 80 percent of the road use occurs from September through December. The primary activities of the motoring public are hunting and wood gathering with some dispersed camping and pleasure driving. Past road use surveys showed a dramatic increase in public use of forest roads in mid-October with a sharp decrease by mid-November. However, changing hunting seasons have produced more gradual increases and decreases in use patterns and extended the length of time the public is using the roads.

A. Human Use

A1. Public Use

Recreation activities in the Oak Creek Watershed are directly influenced by the following:

A large amount of "checkerboard" ownership (Washington State Department of Wildlife, Washington Department of Natural Resources, National Forest, and timber companies), resulting in different management objectives for alternate sections of land.

The area's low elevation and low precipitation (relative to the rest of the Naches Sub-Basin), allow vehicles to access the area early in the spring.

The major elk travel corridor from summer range to the winter feeding grounds lies in the watershed, which results in very heavy elk hunting and associated dispersed camping.

The topography is such that there is only one primary access into the watershed (forest road 1400); steep cliffs effectively isolate the watershed from outside motorized use on three sides. The seasonal closure of forest road 1400 greatly influences the number of people using the watershed in the winter and the type of recreation that occurs during that time.

The variety of vegetation (non-forested lands to forest land) and the variety of landforms (from small lakes to talus slopes) influences the type of recreation that occurs.

The close proximity of the watershed to U.S. Highway 12 and the city of Yakima increase the amount of use and influences some of the types of use the watershed receives.

Big game hunting is the most popular recreation activity in the watershed. Pleasure driving is heavy on U.S. Highway 12 (a designated State Scenic Byway) and arterial roads within the watershed for the reasons stated above. Sightseeing is also very popular in the watershed; the elk viewing area at the Oak Creek Wildlife Area on U.S. Hwy. 12 draws thousands of winter visitors each year. Within the watershed, much of the area lies within 1 mile of a road passable by sedan or pickup truck, and the public has become accustomed to driving to their destination.

There are probably over 100 dispersed campsites within the watershed; 87 of these have been recorded. Seventy-nine of the recorded sites lie on National Forest land. These sites are used primarily during hunting season, and are traditional sites. Dispersed sites are also concentrated adjacent to Bear and Lynne Lakes, and are used throughout the snow free season by anglers and other types of recreationists.

Bear Lake is stocked by the Washington Department of Fish and Wildlife and heavily fished throughout the snow free season. Lynne Lake, Oak Creek and beaver ponds within the area provide more challenging fishing.

Approximately 6000 recreationists enjoy white water rafting on the Tieton River (along the watershed boundary) during September, using U.S. Highway 12 for primary access.

There are approximately nine miles of system trails designed for four-wheel vehicles, typically jeeps, providing the only motorized access to the north westernmost and westernmost portion of the watershed. One trailhead is located off U.S. Highway 12 on private land and accesses a 2.6-mile long trail on National Forest land. There are no snow-parks or groomed snowmobiles trails in the watershed, but snowmobilers use the talus slopes in the northern portion of the watershed, and the open plateaus in the western segment.

There are no special use permits on National Forest land within the watershed. Utility lines cross-State land along U.S. Highway 12.

A variety of commodities are obtained from the watershed, but nothing in large quantity. Commodities include timber, mushrooms, small game, big game, landscaping material, commercial use firewood cutting and post/pole cutting. The area is open to personal use firewood cutting on National Forest land.

A2. Resource Management

Within the Oak Creek Watershed, the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately 49 percent is occupied by dry forest vegetation (low fire regime) dominated by the Oregon white oak, ponderosa pine, Douglas-fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south, west, and east aspects, with approximately 63 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir plant series. These communities comprise approximately five percent of the watershed, with 52 percent being overstocked. Upper elevations, which comprise two percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of the subalpine fir, plant series. Approximately eight percent of these communities are in an overstocked condition. The remaining 44 percent of the area is comprised of non-forest vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

For discussion for this watershed, see the Tieton Watershed Section.

C. Wildlife

The Oak Creek Watershed covers a relatively small area and is in fairly good condition. The Oak Creek Watershed is an important ungulate winter range area. There is potential for improvement as there are portions of the watershed with high road densities, especially within the winter range habitat.

C1. Wide-Ranging Carnivores

The open road density in the Oak Creek Watershed (OCW) is moderate at 1.6 mi/mi^2. Approximately 44.9% of the watershed is core habitat, for a total of 11,190 acres. The open road density in the portion of the Bethel Lynx Analysis Unit located in the OCW is high, at 2.29 mi/mi^2. There are 16.95 miles of open road in the LAU.

C2. Late-Successional Associated Wildlife Species

There are no designated LSR/MLSAs in the Oak Creek Watershed.

C3. Riparian Dependent Wildlife Species

Riparian reserves occupy approximately 3,339 acres (13.4%) of the Oak Creek Watershed. The open road density within the riparian reserves is high, 2.84 mi/mi^2.

C4. Ungulates

The Oak Creek Watershed contains 5,346 acres (21.4%) of winter range with a high open road density of 3.42 mi/mi^2. Ungulate migration occurs in and out of the watershed. It is also a site of California bighorn sheep summer and winter range.

C5. Unique Habitats

Unique habitats are diverse and very abundant in the Oak Creek Watershed, covering 11,007 acres (44.2%). Table 6 summarizes the availability of the unique habitats in this watershed.

Table 6. Availability of unique habitats in the Oak Creek Watershed

Unique habitat	Acres	% of watershed
Grassland	711	2.9
Hardwood	5	0.02
Lithosol	816	3.3
Meadow	103	0.4
QUGA	255	1.0
Rock	3,428	13.7
Shrubland	5,676	22.8
Wetland	13	0.1

Bumping-American Watershed

The Bumping-American Watershed is predominately wilderness, made up of two distinct river basins, both of which are roaded in the lowlands adjacent to the rivers. State Route 410 (S.R. 410), Chinook Pass, provides primary access to the American Watershed. Forest road 1800, Bumping Lake, which originates on S.R. 410, provides access to the Bumping Watershed.

Two wilderness areas, William O. Douglas, south of S.R. 410, and Norse Peak, located north of S.R. 41, dominate the total area of the watershed. Travel through the Wilderness portion of the watershed is by foot or horseback only. Nineteen trailheads within the watershed provide entry points into the backcountry. The most popular trailheads include Chinook Pass summit, Mesatchee Creek, Crow Lake Way, and Union Creek in the American Watershed; and Deep Creek, Swamp Lake, and Goat Peak in the Bumping Watershed.

The transportation system in the Bumping-American Watershed has approximately 80 miles of Forest Service system roads, of which 22 miles or 26% will be considered in this analysis, 23 miles of state highway, 168 miles of foot or pack and saddle trail and three miles of off-highway vehicle trails. There are also approximately 15 miles of unclassified roads within the watershed, mainly accessing dispersed camping sites. There are two boat launches on Bumping Lake providing the opportunity to access the upper Bumping Lake area by boat.

About one-half of the Forest Service roads in the watershed were built for the purpose of

harvesting timber. The remaining roads were constructed to access mining claims, the Bureau of Reclamation's dam construction at Bumping Lake, grazing, fire detection and suppression, or for recreational purposes, such as summer homes.

Forest road 1800 accesses the Bumping Watershed. The first 10.9 miles is an arterial facility maintained to level 5 standards by Yakima County. The remaining 6.1 miles is a collector road maintained by the Forest Service to level 3 standards. Road 1808 (Deep Creek) originates on road 1800 and is maintained to level 3 standards. However, the first 3.6 miles of road 1808 has native surfacing with the last 3.7 miles of the road is aggregate surfacing. It is a high use road by the public to access the trailhead into the Wilderness. Aggregate surfacing was placed to cushion and reduce the roughness of the exposed base rock. Serious consideration should be given to the management objective of this road, specifically to the surface type, operational maintenance level and objective maintenance level with respect to the type and amount of use.

One and a half miles of road 1709 (Devil Creek) is also located in the Bumping Watershed, which originates on S.R. 410. The majority of this road is within the Naches Main Stem Watershed. This is a long term, collector road that is single lane with turnouts and has aggregate surfacing. It is maintained to level 3 standards. The road accesses two summer home groups and a developed campground that are located within the Bumping Watershed.

The American Watershed's only motorized access is by State Route 410 (Chinook Pass), also known as the Mather Memorial Parkway. This highway is maintained by the Washington State Department of Transportation. Chinook Pass is one of five cross-state highways and is closed during the winter months due to snow.

Numerous roads originate on S.R. 410, but the most significant road is 1700462 (Morse Creek). This road accesses two trailheads, private land and mining claims; however, it was not analyzed because it is considered a local road that has native surfacing and is maintained by the Forest Service to level 2 standards. Almost all of the remaining roads in the American Watershed access summer home groups, trailheads, developed campgrounds or dispersed camping sites.

Of the approximately 80 miles of Forest Service System roads in the Bumping-American Watershed, 14 miles have asphalt surfacing, 24 miles have aggregate surfacing, and 42 miles have native surfacing. There are about two miles of native surfaced private road within the watershed.

A. Human Use

A1. Public Use

The Bumping and American Watersheds share the following unique qualities that influence the recreation experience.

- A large designated Wilderness area (73 percent of the total area).
- A high variety of recreation resources available year round.
- A high scenic quality of the areas.
- The close proximity of the Seattle/Tacoma metropolitan area (within 1.5 hours during summer months).

A lower occurrence of motorized off-road recreation.
A high number of historic sites associated with current recreation use.

A1a. American Watershed

Driving for pleasure is the highest use of the American Watershed. State Route 410, the nationally designated All American Highway, is used by thousands of people to access Mount Rainier National Park and Seattle as well as by those who are coming to the American Watershed as a destination. Several stops along this highway offer unique geographical, historical, and natural interpretive information. The highway parallels the American River, nominated for Wild and Scenic designation.

Ten system trailheads are located along S.R. 410. Nine provide access to non-motorized trails within Wilderness; one trailhead and associated trail provides single tread motorized access to the Little Naches drainage.

There are 97 recreation residences within 8 tracts in the American drainage, four patented mining claims in the Morse Creek area, and several unpatented claims in the drainage. The American Ski Bowl is a popular group reservation site.

Three developed campgrounds and two reservation campgrounds are located along S.R. 410. Roughly 70 dispersed campsites lie outside Wilderness in this watershed; all lie adjacent to roads.

Snowmobile use is not permitted within ½ mile of S.R. 410; there are no groomed trails. Snow based activities are non-motorized and include cross-country skiing (one system trail), snow shoeing, and snowboarding. Several sno-parks along S.R. 410 provide non-motorized access.

One outfitter/guide operates in this watershed. Big game hunting is relatively light and based in the Wilderness. Firewood cutting is prohibited.

A1b. Bumping Watershed

While many humans travel through watersheds to reach their destinations, for many people the Bumping Watershed is their destination. The Bumping Watershed attracts many recreationists who are interested in more minimally developed campgrounds or dispersed recreational activities including camping, pleasure driving, hunting, viewing wildlife or in Wilderness activities.

Fourteen system trailheads are located in the watershed. All except Lily Lake and Clover Springs provide access to non-motorized trails within Wilderness. Lily Lake provides non-motorized access to a small non-wilderness lake, and Clover Springs is also a staging area for a four-wheel driveway.

There are 62 recreation residences within 5 tracts in the Bumping watershed, a resort permit at Bumping Marina, and several unpatented mining claims in the drainage.

Five developed campgrounds and five sites with limited development lie within the watershed: Granite Lake, Deep Creek, Bumping Crossing, and Barton Creek. Roughly 80 dispersed

campsites lie outside Wilderness in this watershed, all adjacent to roads.

Winter recreation activities center around roaded access. The turnaround at the end of the plowed portion of the Bumping Lake Road provides access for primarily non-motorized users, cross country skiers and snowshoers. Snowmobile use is light and is not permitted within ½ mile of the Bumping Road or Deep Creek Road. There are no sno-parks.

One system four-wheel driveway, a system trail designed for four-wheel vehicles, typically jeeps, is closed until maintenance activities are completed to minimize resource impacts. Two outfitter guides operate in this watershed. Big game hunting is relatively light and based in the Wilderness. Firewood cutting is prohibited.

Commodities from both watersheds are minimal. Recreationists provide a sizeable amount of money to the local economy.

A2. Resource Management

Within the Bumping/American watershed, the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately six percent is occupied by dry forest vegetation (low fire regime) dominated by the dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south aspects, with approximately 90 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir and western hemlock plant series. These communities comprise approximately 35 percent of the watershed, with 59 percent being overstocked. Upper elevations, which comprise 31 percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of a combination of the subalpine fir, Pacific silver fir, and mountain hemlock plant series. Approximately one percent of these communities are in an overstocked condition. The remaining 28 percent of the area is comprised of non-forest vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Bumping and the American Watersheds are each Tier 1 Key fifth-field watersheds. The majority of management in each watershed is related to recreation. The Bumping and American watersheds are located within the western extent of the Naches Ranger District. This watershed encompasses a total of 124,337 acres.

Bumping lake is a natural lake, which has been further impounded by a dam. The dam, built for irrigation purposes in the early 1900s permanently blocked anadromous fish access to the lake and streams above the lake. A migratory bull trout population has also been isolated above the lake.

Sub-watersheds in the American portion of the watershed are the Lower American, Upper American, Headwaters American, Union, and Timber-Kettle. Bumping Watershed sub-watersheds are the Lower Bumping, Bumping Lake, headwaters Bumping, and Deep Creek.

Existing habitat conditions were obtained from the most recent environmental baseline established in the "Biological Evaluation/Assessment, Bull Trout, westslope Cutthroat Trout, and Steelhead. Ongoing Activities and Projects in the Bumping-American Watershed," August 20, 1998 (USDA FS 1998c). Significant sub-watersheds are from maps updated as part of the roads analysis project using the most recent District fish distribution and status information.

B1. Geologic History

The Bumping and American Watersheds are within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are composed predominately of thick basalt flows, Tertiary volcanics, and pyroclastic flows. The Bumping Watershed has some foliated crystalline bedrock in the upper portion of the watershed. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that have influenced landscape development includes alpine glaciations in the upper watersheds and fluvial down cutting along with structural features in the lower portion of the watershed.

The alpine glacial processes in the upper Bumping and American Watersheds have produced steep U-shaped glacial trough landforms with some glacial-fluvial outwash landforms in the upper watersheds. These glacial troughs total 22,192 acres in the American and 33,855 acres in the Bumping and are covered with varying thicknesses of glacial till. A diagnostic feature of these troughs is the dense pattern of parallel first order drainages. Shallow landslides (debris flows) are a significant source of sediment delivery and often originate from these first order drainages along the interface between glacial till deposits and scoured bedrock. These debris flows have deposited numerous debris fans in the valley floor. As these fans coalesce, they cause stream confinement and streams become bounded by alluvial fans altering stream alignment and gradient. Debris fans can deliver sediment directly into stream systems but a more important sediment delivery mechanism is the degree of stream scour along the margins as streams adjust to the confinement. Most of the generated sediment from these shallow landslides (debris flows) is coarse textured.

Locally deep seated but small collapsed till deposits total 940 acres in the American and 2398 in the Bumping Watersheds. These secondary mass wasting processes have not been extensive enough to modify the initial glacial trough landforms. Occasionally these landslides have slid in to the valley floor creating old impoundments widening valleys and creating wet meadows and low gradient reaches.

Glacial fluvial deposits have formed fairly large terraces and outwash deposits in the mid sections of the Bumping and American Watersheds. These outwash deposits have resulted in wider valley segments immediately above and below Bumping Reservoir. Fluvial down cutting processes have down cut through these old deposits forming elevated terraces, which are no longer a part of the current flood plain. This form of sediment delivery is common during storm events, spring runoff, and if channels have been artificial confined

Another source of sediment delivery is generated from deep-seated landslides. Sediment routing mechanisms are quite different for these sediment sources.

In the lower segments of the Bumping and American Watersheds, large deep-seated landslides and landslide escarpments are a significant source for sediment debris. These deep-seated landslides were stratified during the watershed analysis procedures. Approximately 1684 acres of deep-seated landslides occur in the lower segments of the American watershed and 5448 acres in the Bumping. The large deep-seated landslides occur in Sunrise and Fifes Creeks and east of Cedar Springs Campground. These deep-seated landslides occasionally slide into the stream channels delivering sediment directly into stream systems. Presently these deep-seated landslides have not had a significant affect of confining or altering stream alignment. Most of the confining or alteration was historic and stream systems have already adjusted.

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by
1. Contributing to slope instability.
2. Concentrating runoff and increasing erosion
3. Causing confinement of channels forcing streams to erode channels and banks.

Table 7. Bumping-American Watersheds total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom main stem stream channels
1.8	2.2	20.0	16.3

B2. Fine Sediment (Score Bumping 3, American 1)

There is no fine sediment information for the Bumping River. The Bumping portion of the watershed is rated as functioning at risk due to stream bank erosion. Recreation use including trails, developed and dispersed sites are the major management induced fine sediment source. Recent restoration projects at developed and dispersed sites and trail maintenance should help reduce potential impacts. The Bumping is scored a 3 primarily due to the impacts downstream of the dam.

There is some bank erosion due to developed and dispersed use in the American portion of the watershed. Dispersed use along the stream appears to be increasing and is a management concern. A restoration project to decrease the current and potential impacts of recreation is planned to be implemented in 2001. The American is rated as functioning appropriately for fine sediment. Results of McNeil core samples taken in 1996 showed fine sediment levels in spawning gravels to be between 10.3 and 11.2 percent, and in 1998 fine sediment levels were between 7.6 and 10.9 percent. Samples were taken upstream near Mesatchee Creek in 1999 and fine sediment levels were 14.5 percent. Results of samples collected in 2000 are not available at this time.

B3. Flood Plain Function, Off-Channel Habitat and Riparian Reserves

(Score Bumping 6, American 3)

The watersheds are rated as functioning appropriately, with one exception. Flood Plain connectivity on the lower Bumping River is rated functioning at risk, because of the presence of the 1800 road located within or adjacent to its flood plain. There are locations where the road is confining the river and not allowing it to access its flood plain.

Off-Channel Habitat in the Bumping is rated functioning at risk since the 1800 road is within and adjacent too much of the lower Bumping River flood plain. In addition, very few side channels have been observed along Barton Creek and South Fork Barton Creek, during the surveys even though the stream reaches are in unconfined valleys, which would be expected to contain side channels. Nothing was noted during the survey to indicate why this is the case. Since there is uncertainty as to why side channels are lacking these reaches are rated functioning at risk, until it can be determined what is occurring in these reaches. In the remaining streams within the Bumping portion of the watershed there are side channels present in unconfined valleys and absent in confined valleys as would be expected, so the remainder of the Bumping is rated functioning appropriately.

The American portion of the watershed is rated functioning appropriately relative to Off-Channel Habitat, because side channels are abundant in unconfined valleys and absent in confined valleys as would be expected.

The Riparian Reserves in the majority of the Bumping area are functioning appropriately. Riparian timber harvest is limited to a 1/4-mile segment of Cedar Creek on each side of the T17N R13E sections 21 and 22 section line. The most heavily impacted sub-basin in this area is the lower Bumping River sub-basin with the 1800 road adjacent to the Bumping River, and a large amount of dispersed and developed recreation sites. This portion of the watershed is rated functioning at risk.

The Bumping is scored 6 due to the impacts below the dam.

The Riparian Reserves in the majority of the American are functioning adequately, because very little management activity has occurred in the riparian areas. The most heavily impacted sub-watershed in this area is the lower American River sub-watershed with S.R. 410 adjacent to the American River, and some dispersed and developed recreation sites. The highway is having very little affect on the flood plain. Currently the dispersed recreation is not greatly impacting the riparian reserve, but with the observed increase in recreation use the rating could eventually move to functioning at risk or functioning at unacceptable risk without management of the disturbance associated with recreation. The American is scored 3 due to the concern for potential dispersed recreation impacts if not managed.

B4. Flow Effects (Score Bumping 3, American 1)

Road densities in the Bumping Watershed range from a high of 1.02-miles/square mile in the Lower Bumping sixth-field watershed to a low of 0.0 in several wilderness sub-watersheds. The 1800 road is located within and adjacent to the flood plain of the Bumping River below the dam. Due to the proximity of this road to the river and the road density just slightly greater than 1.0

miles/square mile, the Lower Bumping sixth-field watershed is rated functioning at risk. Apart from the Lower Bumping sub-watershed, there are no sub-watersheds with road densities greater than 1.0 miles/square mile. As a result, the rest of the Bumping portion of the watershed is rated functioning appropriately.

American Watershed road densities range from a high of 1.03-miles/square mile in the Lower American sub-watershed to a low of 0.01 in the Union Creek sub-watershed. Since the Lower American has a road density greater than 1.0 miles/square mile, the rating for this sub-watershed is functioning at risk. Apart from this sub-watershed, there are no sub-watersheds with road densities greater than 1.0 miles/square mile, so the rest of the American portion of the watershed is rated functioning appropriately.

The American portion of the watershed is functioning appropriately with a natural flow regime. The Bumping is functioning at risk due to the regulated flows from the reservoir. Roads are not felt to have a significant influence on flows in either watershed.

B5. At-Risk Fisk Populations (Score Bumping 9, American 9)

The American and Bumping Watersheds contains very important fish habitat. The steelhead population size is unknown, but steelhead are known to occur in the watershed. Resident redband/rainbow occur in the watershed, and it is possible that they are the same population as the steelhead. As a result, it is assumed that the steelhead distribution is similar to that of redband/rainbow. They are known to occur in the American River, from the mouth to Mesatchee Creek; in the lower Bumping River, from the mouth to the dam (the dam is a barrier), and in the lower two miles of an unnamed stream which flows into the right bank of the lower Bumping River in section 27. It is likely that this is very similar to their natural distribution. No sub-watersheds are considered significant for steelhead at this time due to a lack of information on key spawning and rearing areas.

Bull trout are found in the American River. Spawning is known to occur in lower Union Creek, the American River near the confluence of Union Creek and confluence of Kettle Creek. The Union and Upper American sub-watersheds are considered significant. A strong population of bull trout is also found in Bumping Lake. The vast majority of these fish spawn in Deep Creek. There is some concern for the population because the lake isolates the population and there is only one primary spawning stream. Brook trout are also present. The Bumping Lake and Deep Creek sub-watersheds are significant for bull trout. Bull trout use of the Bumping below the reservoir is unknown. Some redds, which may have been bull trout, were observed by biologists conducting spring chinook spawning surveys.

While not a listed species, the Upper and Lower American sub watersheds are significant for spring chinook salmon.

Throughout most of the American-Bumping Watershed, habitat refugia exist and are buffered by intact riparian reserves and wilderness. Due to the quality and amount of habitat, the American is potentially refugia for steelhead and bull trout as well as spring Chinook. Habitat protection should be a high priority. Apparent low bull trout and steelhead population numbers are a concern. Although isolated by Bumping Dam, the Deep Creek and Bumping Lake sub-

watersheds are significant for bull trout. After the Upper Tieton bull trout population, the Bumping population is the strongest in the Naches Sub-Basin.

C. Wildlife

A large proportion of the Bumping/American Watershed is wilderness. Much of the landscape is also high elevation and roadless, generally allowing for higher quality wildlife habitat.

C1. Wide-Ranging Carnivores

The Bumping-American Watershed is in good condition with regard to core habitat. The open road density is low at 0.44 mi/mi^2. Approximately 79.4% of the watershed is core habitat, for a total of 98,839 acres. All or portions of four Lynx Analysis Units are located within the boundaries of the Bumping/American Watershed. These LAUs include: American, Fifes, Rattlesnake and White Pass. The open road density in the four LAUs is low, at 0.42 mi/mi^2. There are 78.51 miles of open road in the LAUs.

C2. Late-Successional Associated Wildlife Species

There are three LSR/MLSAs within the Bumping Watershed: Bumping LSR, Crow MLSA and Milk Creek MLSA. These cover a small portion of the watershed, approximately 5,472 acres (4.4%). The security habitat rating is low for all three, while the habitat effectiveness rating is low for Milk Creek and Bumping, but moderate for Crow.

C3. Riparian Dependent Wildlife Species

Riparian reserves occupy approximately 20,889 acres (16.8%) of the Bumping/American Watershed. The open road density within the riparian reserves is low, 0.89 mi/mi^2.

C4. Ungulates

The Bumping/American Watershed only provides 366 mapped acres (0.3%) of winter range for ungulates. The actual winter range use is higher. However, the road density is therefore also low, 0.74 mi/mi^2. Mountain goats also use this watershed for summer and winter range.

Table 8. Availability of unique habitats in the Bumping-American Watershed

Watershed	Acres	% of watershed
Subalpine fir-Carex	44	0.04
Avalanche Chute	2,080	1.7
Cedar Creek RNA	2,285	1.8
Glacial Cirques	2,607	2.1
Grassland	410	0.3
Meadow	612	0.5
Parkland	5,646	4.5
Rock	20,709	16.6
Shrubfield	452	0.4
Shrubland	16	0.01
Wetland	1,556	1.3

C5. Unique Habitats

Unique habitats are diverse and abundant in the Bumping/American Watershed, covering 36,417 acres (29.3%). Table 8 summarizes the availability of unique habitats in the Bumping-American Watershed.

Naches Main Stem Watershed

The Naches Main Stem Watersheds transportation system consists of 422 (does not include roads within the Wenas Watershed) miles of forest road; approximately 139 miles or 33% will be analyzed. Twenty miles of single tread motorized trails and 2.2 miles of non-motorized trail are within the watershed. State Route 410 provides the primary access to the watershed with limited access provided by numerous low maintenance Department of Natural Resources roads from the Wenas. Nine similarly designed forest roads originate from S.R. 410 and along with their spurs, give full access to the watershed.

Most of the roads in the Naches Main Stem were constructed for the purpose of harvesting timber. Road 1701 and 1702, however, were originally built by early settlers for access to the upper Naches River area from the Wenas. Road 1601 was originally built to provide access to the Little Bald and Clover Springs areas for fire lookouts and fire suppression activities.

Four of the roads that originate from S.R. 410 (Nile Loop road 1600, Swamp Creek road 1706, Milk Creek road 1708 and Devil Creek road 1709) are collector roads maintained at Forest Service Level 3 standards.

Road 1701(Rocky Flat), road 1702 (Rock Creek), road 1703 (Gold Creek), road 1705 (Spring Creek) and road 1707 (Pine Creek) are other primary roads that originate from S.R. 410. These are classified as local roads and are maintenance Level 3. Many of the primary roads are interconnected and create loop routes. Loop routes include: Spring Creek road to Gold Creek road, Milk Creek road to Pine Creek road, Swamp Creek road to Devil Creek or Nile Loop roads, and Rocky Flat road to Rock Creek road. Loop routes are popular with the motoring public especially during hunting season.

Approximately 60 to 70 percent of the road use within the watershed occurs from September to the end of December. The primary activities include hunting, wood gathering and pleasure driving. Past road use counts showed a dramatic increase in public use in mid October and a sharp decline by mid November. However, changed hunting seasons have produced more gradual increases and decreases in use pattern and extended the length of time the public is using the roads.

A. Human Use

A1. Public Use

Much of the heavy recreation use is motorized in this watershed. State Route 410 is nationally recognized as an All-American Highway. Also known as the Mather Memorial Parkway, it is managed for its outstanding scenic and recreational opportunities. Several Forest Roads form

short scenic loops popular for pleasure driving and are easily accessible from S.R. 410. Observation sites include Clemans Lookout, Little Bald Lookout site, and Clover Springs.

Boulder Cave Day Use Site is probably the most heavily visited site within the watershed and is open to vehicles from Memorial Day through mid-September. This attraction draws recreationists that desire a more developed setting. The area is accessed through the remainder of the snow free months by hikers and bicyclists. The trail to the cave is a National Recreation Trail.

Three developed campgrounds are located on the Naches River; Sawmill Flat, Cottonwood, and Halfway Flats. Dispersed camping is popular throughout this watershed with over 600 recorded sites. Most use occurs during hunting season. Other sites, associated with the Naches River are popular during the entire snow free season. Milk Pond Day Use Site, which primarily used for fishing and camping, is partially developed with toilets and picnic tables. The Nile Mill Site is probably the most well known undeveloped dispersed site, with several permitted events occurring throughout the year. Clover Springs serves as a partially developed campsite, as well as a staging area for a four-wheel driveway, and a trailhead for two Wilderness trails.

Snowmobile use is heavy within the watershed. Several loop routes are groomed. Six sno-parks are maintained.

Four-wheel drive use is heavy, with 9 system trails totaling over 30 miles. Four single tread motorized trails totaling over 20 miles cross the watershed.

There are seven recreation residence tracts with 83 homes in the watershed. The power line along the Naches River is under Special Use Permit. Two organization camps, Roganunda and Lost Creek, also operate under Special Use Permit. One outfitter/guide operates in this watershed.

Commercial timber harvest and livestock grazing (by allotment) occurs in this watershed. Other commodities include firewood cutting, Christmas tree gathering, poles, posts, house logs, mushrooms, boughs, transplants, and bear grass.

A2. Resource Management

Within the Naches Main Stem Watershed, the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately 42 percent is occupied by dry forest vegetation (low fire regime) dominated by the Douglas-fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south, west, and east aspects, with approximately 65 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir and western hemlock plant series. These communities comprise approximately 32 percent of the watershed, with 54 percent being overstocked. Upper elevations, which comprise eight percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of a combination of the subalpine fir, Pacific silver fir, and mountain hemlock plant series. Approximately 12 percent of these communities are in an overstocked condition. The remaining 18 percent of the area is comprised of non-forest

vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Naches Watershed is 74,000 acres in size, with 11% of the watershed in private ownership in a checkerboard pattern. The Naches Watershed is designated as a Key Watershed. The Naches Watershed is very popular for recreation especially for ORV use and dispersed camping. Past timber harvest, roads and recreation in riparian areas have impacted aquatic habitat. Private land development has impacted riparian areas and stream banks. There are between 467-494 miles (depending on GIS data used) of system roads in the watershed including the Wenas Watershed area, one-third of which are in the Main Stem Naches Sub-Watershed. Approximately 149 miles of road (30%) are within 300 feet of a stream. There are 36 miles of trail. Sub-watersheds include Main Stem Naches, Rock, Milk, Nile-Dry, and Devil-Swamp.

Existing habitat conditions were obtained from the most recent environmental baseline established in the "Biological Assessment for Steelhead, Bull Trout and Cutthroat Trout for Proposed Action in Naches Watershed: Cleman Mountain Under Burn\Sunup Timber Sale\Update of Baseline and tracking On-going Projects," and the Biological Assessment for Steelhead, Bull Trout and Cutthroat Trout For proposed Actions in the Naches Watershed. February 22, 1999 (USDA FS 1999a).

B1. Geologic Hazard

The Naches Watershed is within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are composed predominately of thick basalt flows, Tertiary volcanic, and pyroclastic flows. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that has influenced landscape development includes volcanism, mass wasting, and fluvial down cutting. The major landforms within the watershed are gently sloping flows – plateaus, moderately steep volcanic flows, deep-seated landslides, shallow landslides (debris flows), and landslide escarpments. Most of the deep-seated landslides are due to the inter-bedded nature of the bedrock. Often inter-beds have finer textures, which produce lubricated interfaces, which tend to be plains of weakness trigger slope failures. Most of these landslides occur along the margins of basalt or within the pyroclastic flows.

The major sources of sediment delivery are generated from deep-seated landslides, shallow landslides (debris flows) and stream scour of channels and banks. Sediment routing mechanisms are different for each of these sediment sources.

Deep-seated landslides can be small or very large depending upon the localized conditions. These deep-seated landslides were stratified during the watershed analysis procedures. Approximately 7400 acres of small isolated deep-seated landslides occur throughout the watershed. Another 8522 acres of large deep-seated landslides also occur within the watershed. The large deep-seated landslides occur in White , Swamp, and Devils Creeks. These deep-seated landslides occasionally slide into the valley floor delivering sediment directly into stream systems. Once slides block stream channels, additional sediment is associated with the affect of

streams attempting to readjust to this confinement. Streams continue to readjust to this confinement by

Down cutting through the toe of many landslides.

Shifting alignment and undercutting confining toe slopes creating V-notched inner gorges.

Shifting base level and eroding channel beds immediately downstream of local confinement, (related to rocky slide debris).

Undermining the toe of landslides creating unstable slope conditions and triggering additional failure into the channel perpetuating the process.

During this stream adjustment, accelerated levels of sediment are being routed and delivered due to the initial landslide blocking channels.

The landslides escarpments total 5,500 acres and occur along the upper slopes of the Manastash Ridge tend to concentrate runoff delivering debris and elevated flows into first order drainages triggering shallow landslides (debris flows). Such landslides flow directly into higher order stream channels normally during storm events or spring runoff. Debris flows also tend to scour existing stream channels. This form of sediment delivery is common in upper drainages of Milk and Devils Creeks.

Glacial-fluvial deposits have widened the lower valley segments of the Main Stem Naches. Stream down cutting has elevated most of these deposits creating a number of terraces that are not currently in the active flood plain. At the present time, stream scour of channel banks is a major source of sediment delivery in the lower segments of the Main Stem Naches Watershed. This form of sediment delivery is common during storm events, spring runoff, and if channels have been artificially confined.

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by

Contributing to slope instability.

Concentrating runoff and increasing erosion.

Causing confinement of channels forcing streams to erode channels and banks.

Table 9. Mainstem Naches Watershed total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom mainstem stream channels
16.9	16.4	3.9	17

B2. Fine Sediment (Score 6)

Fine sediment within spawning gravel has not been sampled in the Naches. Due to the lack of information and concerns about status of other watershed conditions that can increase delivery of fine sediment, (high road density, high levels of past timber harvest and natural potential for fine sediment) the watershed is judged to be Functioning At Risk. Roads are a potential contributor to

fine sediment due to all five sub-watersheds with road densities greater than 2.4-miles/mi. sq., ranging from 2.5-mi/mi. sq. to 4.5-mi/mi. sq. Increased drainage network due to roads in the sub-watersheds is estimated to range between 10%-21% depending upon the sub-watershed. The road density and location watershed condition element is rated as Functioning at Unacceptable Risk. Travel restrictions on many roads during wet seasons help mitigate fine sediment delivery to streams. The watershed is scored a 6 because roads are believed to be contributing to accelerated fine sediment delivery.

B3. Flood Plain Function, Off-Channel Habitat and Riparian Reserves (Score 9)

Flood plain connectivity is functioning appropriately for the Naches River tributaries most of which are A and B channels without extensive side channel or flood plain areas. Exceptions to this are segments of lower Rock Creek and Gold Creek that are functioning at risk and Orr Creek, which is functioning at unacceptable risk due to roads in portions of the flood plain. Flood plain connectivity for the Naches River is functioning at unacceptable risk, because the river has been cut off from portions of its flood plain by roads.

Off-Channel Habitat is functioning appropriately for the Naches River tributaries most of which are A and B channels without extensive side channel or flood plain areas. Exceptions to this are segments of lower Rock Creek and Gold Creek that are functioning at risk and Orr Creek is functioning at unacceptable risk due to roads in portions of the flood plains. Off-Channel Habitat and flood plain connectivity for the Naches River is functioning at unacceptable risk, because the river has been cut off from portions of its flood plain by roads and dikes.

The Riparian Reserve system in the Naches Watershed associated with the tributaries is rated functioning at risk, due to the effects of past riparian timber harvest and roads. The Riparian Reserve of the Naches Main Stem is functioning at unacceptable risk. The Naches River Riparian Reserve has been fragmented by the presence of State Route 410 on one side and the 1704 (Old River Road) road on the other and the presence of dispersed and developed campsites along both sides of the river. Along 15.8 miles of the Naches Main Stem there are 2.2 miles of riprap associated with roads and 20% of the total area within 300' of both sides of the river has been disturbed by human development including roads, structures, private homes and campgrounds. Projects have been recently implemented to improve riparian habitat in recreation areas.

B4. Flow Effects (Score 6)

The Naches Watershed is rated functioning at unacceptable risk relative to road density, because all of its 5 sub-watersheds have road densities greater than 2.4 mi/mi2, ranging from 2.5 mi/mi2 to 4.5 mi/mi2. There are several valley bottom roads including State Route 410 along one side of the Naches Main Stem and the 1704 road (Old River Road) along the other side of the Naches Main Stem in the upper part of the watershed and roads along portions of Rock Creek, Gold Creek, Milk Creek, and Orr Creek. The sub-watersheds with the Naches Watershed have increases in drainage network due to roads ranging from 10% to 21% measured by assuming that 300' of road on either side of a stream crossing drains into the stream.

The Change in Peak/Base Flow element for the Naches Watershed is rated as functioning at risk. The Naches Watershed showed a slight increase in average annual stream flow over the 1939 to 1990 period of record. It is possible, but uncertain whether or not this increase is due to forest management activities. The reservoir on the Bumping River has altered the flow regime in the watershed and has likely altered the peak flows as well. The amount of roads and timber harvesting in the watershed are a concern in terms of their impacts on the peak flows therefore the watershed is scored 6.

B5. At-Risk Fish Populations (Score 6)

Bull trout and steelhead are present in the watershed. Bull trout are found in the Main Stem Naches River. Fluvial adults are known to use the Main Stem Naches River, because every year an angler or two report catching a bull trout. It is not known if bull trout are spawning anywhere in the Naches watershed. No bull trout have been found recently in any of the major tributaries (Gold Creek, Lost Creek, Swamp Creek, Devil Creek, Rock Creek, Nile Creek, and Milk Creek) or off-channels of the Naches River, even though a considerable amount of monitoring (electro-fishing, minnow traps, and drop lines) has been done over the last six years. One adult bull trout (approximately 25 cm) was captured in Milk Creek while electro-fishing approximately 200 feet from its mouth. Based on the high turbidity in Milk Creek, it has been assumed that this fish came into the bottom of Milk Creek to feed on the numerous small fish (sculpins, juvenile chinook, small rainbow). It has been reported that bull trout used to be caught in Nile Creek and Orr Creek (tributary to Nile) in the 1970s, so it is possible that they still occur in the Nile-Dry sub-watershed. No sub-watersheds are considered to be significant for bull trout.

Determining the distribution and status of steelhead is difficult due to spawning in the spring when flows are high and turbid (making observation difficult) and it is impossible to distinguish, visually, juvenile steelhead from resident redband/rainbow. Steelhead are known to be in the Main Stem Naches. Past telemetry studies indicated a large portion of the radio tagged fish that spawned in the sub-basin spawned in the main stem Naches River. The Main Stem Naches is considered significant for steelhead. Steelhead are assumed to be in the other sub-watersheds as well. Man-made barriers created by culverts associated with roads are known to exist in five locations in the watershed. State Route 410 culverts on Gold and Rock Creeks, the 1703 culvert on Gold Creek, the 1706200 culvert on Swamp Creek, and the 1704311 culvert on Lost Creek are barriers to steelhead and bull trout.

Habitat connectivity for bull trout and steelhead exists between the Naches Watershed and other watersheds such as the Rattlesnake, Little Naches, and American-Bumping. The Naches is probably not potential refugia for bull trout because it appears little spawning or rearing occurs. The Main Stem Naches, however is probably important adult and migration habitat and important for connectivity between populations in the American, Rattlesnake and possibly Little Naches Watersheds. Refugia habitat for steelhead in the watershed is rated as functioning at risk due to habitat conditions in the Main Stem Naches. The Main Stem Naches is important as a significant sub-watershed for steelhead.

C. Wildlife

The substantial number of roads in the Main Stem Naches Watershed provides high-level

motorized human use with potentially great effects on wildlife. The potential to improve habitat is very high.

C1. Wide-Ranging Carnivores

Core habitat is in very limited in the Main Stem Naches Watershed. The current open road density is high at 2.58 mi/mi^2. Only 20.5% of the watershed is core habitat, for a total of 17,654 acres. The open road density in the two Lynx Analysis Units (LAU's), Manastash Ridge and Rattlesnake, is high as well, at 2.53 mi/mi^2. There are 176.69 miles of open road in the LAU's.

C2. Late-Successional Associated Wildlife Species

The four LSR/MLSAs in the Tieton watershed: Manastash Ridge LSR, Upper Nile LSR, Haystack MLSA and Milk Creek MLSA, cover only a small portion of the watershed, 5,333 acres (6.2%). Consequently, the security habitat and habitat effectiveness ratings are low for all four.

C3. Riparian Dependent Wildlife Species

Riparian reserves are strongly influenced by the road system in the Main Stem Naches Watershed. Riparian reserves occupy approximately 16,452 acres (19.1%) and have a very high open road density of 3.06 mi/mi^2.

C4. Ungulates

The Main Stem Naches Watershed provides a large area of ungulate winter range. The watershed contains 12,610 acres (14.6%) of winter range with a high open road density of 2.8 mi/mi^2. California bighorn sheep summer range is located within this watershed.

C5. Unique Habitats

Unique Habitats are diverse and abundant in the Main Stem Naches Watershed, covering 12,746 acres (14.8%). Table 10 summarizes the availability of unique habitats in the watershed.

Table 10. Availability of unique habitats in the Main Stem Naches Watershed

Unique habitat	Acres	% of watershed
Boulder Cave	22	0.03
Grassland	515	0.6
Landslide	42	0.04
Lithosol	621	0.7
Meadow	331	0.4
Parkland	1,306	1.5
Pioneer	345	0.4
Rock	5,385	6.3
Shrubland	3,826	4.4
Wetland	353	0.4

Little Naches Watershed

The Naches Pass road 19, commonly called the Little Naches Road, provides access to and travel within the Little Naches drainage. The road is a long term arterial that is double lane, paved, maintenance Level 4 road and accepts all classes of vehicles. It provides access for all multiple use traffic for the drainage. Road 1902 (Raven Roost), road 1903 (Quartz Meadow), road 1906 (South Fork Little Naches), and road 1922 (Crow Creek) are collector roads located within the Little Naches drainage. They are single lane with turnouts, gravel surfaced and maintenance Level 3. Some of the other roads that access smaller drainages within the Little Naches are road 1901 (Quartz Creek) and road 1920 (Fifes Ridge). Road 1901 has share cost agreements with commercial use and special use permits. Road 1920 has trailhead access.

Approximately 10 miles of OHV and 90 miles of single tread motorized system trails also provide access. The drainage includes thirty-one miles of pack & saddle trails providing non-motorized access. The present system of roads in the Little Naches fully meets the current user needs and demands; however a large number of user built trails exist indicating that the system trails do not.

User preference varies greatly depending upon each individual's personal, recreational or commercial interests within the drainage. Motoring public in cars and pickup trucks is, by far, the largest visitor group to the area. Motorcycles, all-terrain vehicles (ATV's), and four-wheel drive (4WD) vehicles using their respective trails would be the next largest group. Snowmobiles use many of the travel routes in the winter. Logging trucks and equipment use the road system for timber harvest on both private and Forest Service land.

There are numerous roads and trails within the watershed that have been built and are being used by forest visitors. Most user built roads access undeveloped or dispersed camping areas while user built, motorized, single tread trails are used for recreational riding purposes. Some user built 4WD trails exist and are used by 4WD vehicles and ATV's.

Numerous pack and saddle trails that are located in that part of the Norse Peak Wilderness, which lies in the Little Naches drainage, are user built. The locations of some of these motorized and non-motorized trails are not known.

Several single tread motorized trails on the northeast edge of the drainage tie into other trail systems that are administered by the Cle Elum Ranger District of the Okanogan and Wenatchee National Forests or Plum Creek Timber Company. Travel destinations of Easton, Cle Elum, and Ellensburg are possible using existing trails. The Little Naches Pass and Manastash Ridge 4WD trails tie into roads or trails outside the Little Naches. Those using the Manastash Ridge trail can have destinations of the Wenas Valley, Cle Elum and Ellensburg.

There are no trails in the Little Naches providing access or travel opportunities for people with disabilities. Most roads within the drainage will accept vehicles specifically designed to transport disabled people for the purpose of scenery seeking or motor touring. A portion of one campground, Kaner Flat, is accessible to disabled individuals. This campground meets easy to moderate accessibility design standards for recreational opportunities.

There are a total of 274 miles of system roads within the Little Naches Watershed.

Approximately 68 miles or 25 % will be considered in this analysis.

A. Human Use

A1. Public Use

This watershed is most widely known for its motorized trails, dispersed camping opportunities, big game hunting, and snowmobiling. Much of the heavy recreation use is motorized in this watershed and centers around the Little Naches Road. A unique feature of this watershed is that a significant amount of the recreation use comes over the ridge top on trails from the Cle Elum and White River Ranger District instead of on the roads.

Dispersed camping is popular throughout this watershed with over 500 sites recorded. Most use occurs on weekends during the snow free months. Seven of these areas have some level of development. Use is heavy throughout the summer from recreationists using the trails and continues with hunters using the sites during big game season. Two developed campgrounds lie along the Naches River, Little Naches and Kaner Flat.

Snowmobile use is heavy within the watershed. Several routes are groomed. The Little Naches is a popular area for west-side snowmobilers who access the area via trails originating outside the watershed. Three snow-parks are maintained.

There are about 15 miles of system four wheel driveways, 87 miles of single tread motorized trails, and 37 miles of non-motorized trails (primarily in the wilderness), and an unknown number of motorized non-system trails.

There is one recreation residence tract with 11 homes in the watershed. One outfitter guide operates in this watershed.

Commercial timber harvest and livestock grazing (by allotment) occurs in this watershed. Other commodities include firewood cutting, Christmas tree gathering, poles, posts, house logs, and mushrooms.

A2. Resource Management

Within the Little Naches Watershed the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately nine percent is occupied by dry forest vegetation (low fire regime) dominated by the Douglas fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south, west, and east aspects, with approximately 84 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir and western hemlock plant series. These communities comprise approximately 33 percent of the watershed, with 30 percent being overstocked. Upper elevations, which comprise 46 percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are composed of a combination of the subalpine fir, Pacific silver fir, and mountain hemlock plant series. Approximately 14 percent of these communities are in an overstocked condition. The remaining 12 percent of the area is comprised of non-forest

vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Little Naches joins the Bumping River to form the Naches River. The Little Naches Watershed is 95,000 acres in size with 12% of the watershed in private ownership in a checkerboard pattern in Mathew-Pileup, Bear, and North Fork Little Naches sub-watersheds. Timber harvest has occurred on most of the private lands. The Little Naches Watershed has been designated a Key Watershed. Sub-watersheds include the Main Stem Little Naches, Matthew-Pileup, Bear Creek, North Fork Little Naches, South Fork Little Naches, Lower Crow, and Upper Crow Creek.

The Little Naches Watershed sees extensive recreation use with ORV use and dispersed riparian area camping major attractions. Timber harvest, roading and recreation are some of the biggest impacts affecting fish resources in the watershed.

Existing habitat conditions were obtained from the most recent environmental baseline established in the "Biological Assessment for Steelhead, Bull Trout, and Cutthroat Trout for the Proposed Actions in the Little Naches Watershed," January 29, 1999 (USDA FS 1999c). Significant sub-watersheds are from maps updated as part of the roads analysis project using the most recent District fish distribution and status information.

B1. Geologic Hazard

The Little Naches Watershed is within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are composed predominately of thick basalt flows, tertiary volcanics, and pyroclastic flows. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that have influenced landscape development includes volcanism, alpine glaciations, and fluvial down cutting. The alpine glacial processes over-steepened the terrain in the Little Naches Watershed increasing or triggering mass wasting processes in the fine textured pyroclastic bedrock. These secondary mass wasting processes have modified the initial glacial forms. The major landforms within the watershed include deep seated and shallow landslides, landslide escarpments, and moderately steep basalt or pyroclastic flows. Most of the deep-seated landslides are due to the inter-bedded nature of the bedrock. Often inter-beds have finer textures, which produce lubricated interfaces, which tend to be plains of weakness trigger slope failures. Most of these landslides occur along the margins of basalt or within the pyroclastic flows.

The major source of sediment delivery is generated from deep-seated landslides; shallow landslides (debris flows) and stream scour of channels and banks. Sediment routing mechanisms are quite different for these sediment sources.

Deep-seated landslides can be small or very large depending upon the localized conditions. These deep-seated landslides were stratified during the watershed analysis procedures. Approximately 23,025 acres of small isolated deep-seated landslides occur throughout the

watershed and another 6,220 acres of large deep-seated landslides also lie within the watershed. The large deep-seated landslides occur within White Creek, Swamp Creek, and Devils Creek. These deep-seated landslides occasionally slide into the valley floor stream delivering sediment directing into stream systems. Once slides block stream channels, additional sediment is associated with the affect of streams attempting to readjust to this confinement. Streams continue to readjust to this confinement by

Down cutting through the toe of many landslides.

Shifting alignment and undercutting confining toe slopes creating V-notched inner gorges.

Shifting base level and eroding channel beds immediately downstream of local confinement, (related to rocky slide debris).

Undermining the toe of landslides creating unstable slope conditions and triggering additional failure into the channel perpetuating the process.

During this stream adjustment, accelerated levels of sediment are being routed and delivered due to the initial landslide blocking channels.

The landslide escarpments total 11,956 acres and occur along the upper slopes of the Manastash Ridge. These escarpments tend to concentrate runoff-delivering debris and elevated flows into first order drainages triggering shallow landslides (debris flows). Such landslides flow directly into higher order stream channels normally during storm events or spring runoff. Debris flows also tend to scour existing stream channels. This form of sediment delivery is common in upper drainages of Milk Creek and Devils Creek.

Stream scour of channel banks is a major source of sediment delivery in the lower segments of Little Naches Watershed. This form of sediment delivery is common during storm events, spring runoff, and if channels have been artificial confined.

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by; 1) contributing to slope instability, 2) concentrating runoff and increasing erosion, and 3) confinement of stream channels and reducing flood plain function.

Table 11. Little Naches Watershed total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom mainstem stream channels
4.1	6.7	2.0	14.3

B2. Fine Sediment (Score 6)

Spawning gravel fine sediment has been sampled and measured in the Little Naches River and some of its tributaries on an annual basis since 1991. In general, fine sediment (<1.0 mm) levels have ranged between 12 and 20 percent with some reaches exceeding 20%, resulting in a functioning at risk rating. The Little Naches Watershed is somewhat naturally unstable as far as

fine sediment is concerned, but fine sediment levels appear to have been increased by timber harvest, roads and riparian recreation. For example, of 215 miles of road surveyed in the Little Naches Watershed in 1992, 55% was at an increased risk of sediment delivery to streams with 20% showing evidence of actively delivering sediment to streams. To reduce erosion potential associated with roads, 16 miles of road have been obliterated within the watershed in the past 4 years. Between road improvements that Plum Creek Timber and the Forest Service have done in the watershed approximately half of all the areas of concern associated with sediment delivery have been taken care of through surfacing native surface roads, installing ditch relief pipes and stabilizing cut slopes.

In the Little Naches Watershed, fine sediment levels have been trending downward at most sites over the last 3-4 years and since 1995 only one of 11 sampled reaches has exceeded the 20% fine sediment level and that only one time. Roads and dispersed recreation remain a concern for fine sediment delivery therefore the score is 6.

B3. Flood Plain Function, Off-Channel Habitat and Riparian Reserves (Score 10)

Flood Plain Function and Off-Channel Habitat are functioning appropriately for the Little Naches River tributaries most of which are A and B channels without extensive side channel or flood plain areas. Off-Channel Habitat for the Little Naches Main Stem is functioning at unacceptable risk, because the river has been cut off from portions of its flood plains by roads.

The Riparian Reserve system in the Little Naches Watershed associated with the tributaries is rated functioning at risk, because there is a moderate level of habitat disturbance due to land management on first, second, and third order stream channels. Riparian timber harvest and riparian roads cause the management impacts. The Riparian Reserve of the Little Naches is functioning at unacceptable risk. The Little Naches Riparian Reserve has been fragmented by the presence of the 1900 road and the presence of dispersed and developed campsites. A 1994 inventory found 22 dispersed sites occupying approximately 30 acres within the riparian zone of the Little Naches River and there were also 3.25 miles of user-built roads associated with these sites. In addition much of the downed woody debris in the dispersed riparian campsites is cut up for firewood. Active and on-going rehabilitation of dispersed sites combined with an education program should result in improved riparian habitat condition. Flood Plain Function and the condition of Riparian Reserves, especially along the Main Stem Little Naches remains a management concern therefore the 10 score.

B4. Flow Effects (Score 6)

The Little Naches Watershed is rated functioning at risk relative to road density, because its sub-watersheds have road densities ranging from 1.0 mi/mi2 to 3.5 mi/mi2, excluding the Wilderness portion of Crow Creek. There are 3 sub-watersheds with road densities >=2.0 mi/mi2: NF Little Naches (2.0), Lower Crow (2.8), and Main Stem Little Naches (3.5). There are some valley bottom roads, with the greatest impact associated with the 1900 road adjacent to the Little Naches River. Excluding the upper Crow Fish Production Unit (FPU) which is Wilderness, the Little Naches sub-watersheds have increases in drainage density ranging from 4.92 to 23.31% measured by assuming that 300' of road on either side of a stream crossing drains into the stream.

The lower Crow and Main Stem Little Naches sub-watersheds are functioning at unacceptable risk. The Main Stem Little Naches sub-watershed also has the highest proportion of its stream length with a road within 300' of a stream channel (1/3) while lower Crow has 22% of its stream length with a road within 300'. These figures do not count the user built roads in the watershed.

Little Naches watershed is rated functioning at risk. Flows appear to have increased since the onset of intensive forest management and road construction.

B5. At-Risk Fish Populations (Score 6)

In the Little Naches Watershed it is assumed that the distribution of steelhead is the same as that of redband/rainbow. Redband/rainbow are distributed throughout the Main Stem Little Naches, in North Fork Little Naches from the mouth to Blowout Creek, in the lower 1/2 mile of S.F. Little Naches, and in Crow Creek from the mouth to Crow Creek Lake. It is likely that redband also occur in the lower end of the other perennial tributaries to the Little Naches River. The number of individuals in the Little Naches subpopulation is unknown, because of the difficulty of looking for spawners during high water conditions, and the difficulty in distinguishing juvenile steelhead from resident redband/rainbow. The Little Naches sub-watershed is believed to be an important steelhead-spawning stream and is considered a significant sub-watershed at this time.

Bull trout spawning has recently been observed in Crow Creek. Because this is the only known bull trout spawning population in the Little Naches Watershed, the Upper Crow sub-watershed is considered significant. Bull trout juveniles have been observed in lower Quartz Creek, near the mouth, and an angler reported catching a 20+ inch bull trout near Pileup Creek. No other bull trout have been observed in the Little Naches Watershed.

Refugia for steelhead are functioning at risk in the watershed and for bull trout functioning at unacceptable risk. Habitat degradation due to loss of habitat complexity from loss of off-channel habitat maybe due to roads, riparian timber harvest, recreation use, stream clean out and channelization. Habitat connectivity exists within the watershed and with other watersheds such as the Main Stem Naches, American-Bumping, and Rattlesnake. The Little Naches is a priority for restoration therefore the Score of 6.

C. Wildlife

The high road density and resulting habitat conditions in the Little Naches Watershed are comparable to the Main Stem Naches Watershed, to a slightly lesser degree. Because the Little Naches Watershed is a site of heavy human use year round the potential to improve habitat is high.

C1. Wide-Ranging Carnivores

The open road density in the Little Naches Watershed is moderate at 1.3 mi/mi^2. Approximately 52.3% of the watershed is core habitat, for a total of 49,842 acres. This watershed contains numerous Lynx Analysis Units, including; Cascade Crest, Fifes, Manastash Ridge, Mt. Clifty and Naches Pass. The open road density in the five LAU's is moderately low at 1.03 mi/mi^2. There are 129.47 miles of open road in the LAU's.

C2. Late-Successional Associated Wildlife Species

Portions of three LSR/MLSAs are located within the Little Naches Watershed; Manastash Ridge LSR, Crow Creek MLSA and Milk Creek MLSA. These LSR's cover approximately 16,424 acres (17.2%). The security habitat ratings are low for all three LSR/MLSAs, while the habitat effectiveness ratings are low for Manastash Ridge LSR and Milk Creek MLSA and moderate for Crow Creek MLSA.

C3. Riparian Dependent Wildlife Species

Riparian Reserves occupy approximately 19,388 acres (20.3%) of the Little Naches Watershed. The open road density within the riparian reserves is high, 2.84 mi/mi^2.

C4. Ungulates

Only 245 (0.3%) acres of ungulate winter range are mapped within the Little Naches Watershed. The limited habitat results in a road density of 0.0 mi/mi^2. This mapped winter range acreage is likely lower than the actual winter range use within the Little Naches Watershed. There is also mountain goat winter range in the watershed.

C5. Unique Habitats

Unique Habitats are diverse and fairly abundant in the Little Naches Watershed, covering 11,740 acres (12.2%). Table 12 summarizes the availability of Unique Habitats in the Little Naches Watershed.

Table 12. Availability of unique habitats in the Little Naches Watershed

Unique habitat	Acres	% of watershed
Subalpine fir-Carex	403	0.4
Glacial Cirques	911	1.0
Marsh	16	0.02
Meadow	9	0.01
Montane Meadow	442	0.5
Parkland	1,285	1.3
Pioneer	778	0.8
Rimrock PGA	509	0.5
Rock	6,089	6.4
Shrubfield	615	0.6
Wetland	683	0.7

Rattlesnake Watershed

The Rattlesnake Watershed includes Wilderness and Non-Wilderness areas with the eastern portion being roaded and the western portion non-roaded. Road 1500 (Bethel Ridge), provides primary motorized access to the watershed from both State Route 410 (S.R. 410), Chinook Pass, and U.S. Highway 12, White Pass. The Little Rattlesnake Road, (Road 1501) provides access through the Little Rattlesnake drainage. Access to the McDaniel Lake area is provided by, McDaniel Lake Road (Road 1502). The northern edge of the motorized portion of the watershed

is accessed via the Dry Ridge road system, road 1601.

The William O. Douglas Wilderness area is accessed from Cash Prairie, MJB trailhead, Rattlesnake Trailhead, and McDaniel Trailhead. User portals at Whisky Stop, Meeks Table, and Red Rock offer additional entry points. Thunder Creek trail in the Bumping and Indian Creek trail on White Pass are also used to access the area.

Rattlesnake Watershed has 114.88 miles of Forest Service system roads, and 33.58 miles of private roads. Fifty seven miles or 50% will be considered in this analysis. This watershed contains 8.02 miles of OHV trails and approximately 44 miles of groomed snowmobile trail. There are 56.26 miles of pack and saddle trails in the Wilderness and 3.07 miles of non-motorized single tread trail located outside the Wilderness. Fifteen identified heliports are located in the watershed and are mainly used for search and rescue and firefighter access. Most of the Forest Service system roads in the watershed were constructed for the purpose of harvesting timber. Road 1500 (Bethel Ridge), road 1500190 (Timberwolf Mountain), and road 1500199, (Cache Prairie) were constructed in the early 1930s and were built for fire suppression and sheep grazing permit administration.

Road 1500 originates from the Nile County road with the first 7.1 miles having asphalt surface and is maintained to Level 3 standards. The remainder of road 1500 is aggregate surface and is also maintained to Level 3 standards. Road 1501 (Little Rattlesnake), has asphalt surface for the first 5.5 miles and aggregate surface for the remaining 4.8 miles, and is maintained to Level 3 standards.

A significant road within the watershed is the Road 1503 (Devils Canyon). Road 1503 is maintained to Level 3 standards with 3.4 miles of asphalt surfacing and 4.4 miles of aggregate surface. Road 1503 originates on road 1500 and terminates on road 1501 creating a loop road, which is typically popular with the motoring and snowmobiling public.

Road 1500, 1501 and 1503 receive use year around with the primary activities of the public being motor touring, hunting, wood gathering, dispersed camping, and snowmobiling. The public begins using road 1502 early in the summer to take advantage of low elevation dispersed camping opportunities at Rattlesnake Springs and McDaniel Lake. The remaining roads in the watershed receive the majority of their use between September and December with the primary activities being hunting and wood gathering.

The majority of the roaded area in the watershed is within the non-forest or dry-forest vegetation groups. Typically roads in these vegetation groups have dramatically increased surface damage and potential sediment production when used during wetter times of the year. The road system in this watershed, however does not display this kind of damage largely due to the asphalt and aggregate surfacing present on the majority of the roads.

A. Human Use

A1. Public Use

Possibly the most important or noticeable recreation opportunities in the Rattlesnake Watershed include the large numbers of dispersed sites available three seasons of the year, the big game opportunities, pleasure driving, and the groomed snowmobile routes.

There are no developed campgrounds in the Rattlesnake Watershed. There are approximately 400 dispersed sites within the Rattlesnake Watershed. Self-service sites with some level of development include Rattlesnake Springs on forest road 1500 and McDaniel Lake. Both sites are heavily used throughout the snow free season. McDaniel Lake is heavily used for fishing and camping as well as a base for hunting camps. Rattlesnake Springs is used throughout the spring and summer; several permitted events occur there. Hunting camps occur throughout the watershed.

Forest road 1500 is promoted and heavily used for pleasure driving; it offers a variety of side trips, several unique scenic views, and connects U.S. Highway 12 and State Route 410. Observation sites/scenic viewpoints of note include Timberwolf Lookout site, Rattlesnake viewpoint, and Cash Prairie overlook.

Snowmobile use is heavy within the watershed. Several roads are groomed and there is a Snow-Park at the junction of forest road 1500 and 1501.

There are five system trailheads within the watershed (Cash Prairie, MJB, Rattlesnake, McDaniel/Mt. Aix, and Clover Springs) and three other areas that function as trailheads from time to time (Meeks Table, Red Rock, and Whiskey Stop). All single tread trails are used to access Wilderness; none are motorized. Three four-wheel driveways are located within this watershed (Little Rattlesnake, Rattlesnake, and segments of Mud Springs).

Special Uses include two outfitter/guide permits, which, except for staging, primarily operate within the Wilderness boundary. There are no recreation residences or other recreation type special use permits within the watershed.

Unique topographical features within the watershed draw some recreationists, including Meeks Table, Devil's Table, Red Rock, and basalt columns.

Commodities within the watershed include firewood cutting, permitted Christmas tree harvesting, commercial timber, and mushrooms.

A2. Resource Management

Within the Rattlesnake Watershed the natural vegetation is generally distributed along a gradient of moisture and temperature. Approximately 30 percent is occupied by dry forest vegetation (low fire regime) dominated by the Douglas-fir and dry grand fir plant series. These dry forest communities occur primarily at lower elevations and are most common on south, west, and east aspects, with approximately 83 percent of them being in an overstocked condition. North aspects, riparian areas, and mid-elevations support mesic forest vegetation (moderate fire regime) consisting of wet grand fir plant series. These communities comprise approximately 14 percent of the watershed, with 72 percent being overstocked. Upper elevations, which comprise 28 percent of the watershed, are dominated by wet forest vegetation (high fire regime), and are

composed of a combination of the subalpine fir and mountain hemlock plant series. Approximately two percent of these communities are in an overstocked condition. The remaining 28 percent of the area is comprised of non-forest vegetation types distributed throughout the watershed. Noxious weeds are present in the watershed. They occur primarily in non-forest, dry forest, and mesic forest, along roadsides or on disturbed sites.

B. Aquatics

The Rattlesnake watershed is a Tier 1 Key Watershed encompassing 85,610 acres, of which Boise Cascade Corporation, Washington Department of Wildlife, and various small lot owners privately own 10,214 and the remaining 75,400 acres are part of the Naches Ranger District. Of the total, 49,768 acres are located within the boundaries of the William O. Douglas Wilderness Area. Administratively withdrawn land in the watershed consists of 261 acres east of the Wilderness boundary. The watershed is divided into five sub-watersheds: North Fork Rattlesnake, Lower Rattlesnake, Hindoo-Buck, Little Rattlesnake, and Headwaters Rattlesnake.

Existing habitat conditions were obtained from the most recent environmental baseline established in the "Biological Evaluation/Assessment, Bull Trout, West slope Cutthroat Trout, and Steelhead. Ongoing Activities and Projects in the Rattlesnake Watershed," June 22, 1998 (USDA FS 1998f) . Significant sub-watersheds are from maps updated as part of the roads analysis project using the most recent District fish distribution and status information.

B1. Geologic Hazard

The Rattlesnake Watershed is within the Naches Mountains Subsection (USDA FS 1994c). The Naches Mountains are composed predominately of thick basalt flows, tertiary volcanics, and pyroclastic flows. Several geomorphic processes have been functioning to create a variety of landforms. The primary geomorphic processes that have influenced landscape development includes alpine glaciations in the upper watersheds and fluvial down cutting along with mass wasting and structural features in the lower portion of the watershed.

The alpine glacial processes in the upper Rattlesnake Watershed have produced steep U shaped glacial trough landforms. These glacial troughs all occur within the William O. Douglas Wilderness Area. Within this area, glacial troughs total 11,947 acres and are covered with varying thicknesses of glacial till. A diagnostic feature of these troughs is the dense pattern of parallel first order drainages. Shallow landslides (debris flows) are a significant source of sediment delivery and often originate from these first order drainages along the interface between glacial till deposits and scoured bedrock. These debris flows have deposited numerous debris fans in the valley floor. As these fans coalesce, they cause stream confinement and streams become bounded by alluvial fans altering stream alignment and gradient. Debris fans can deliver sediment directly into stream systems, but a more important sediment delivery mechanism is the degree of stream scour along the margins as stream adjust to the confinement. Most of the generated sediment from these shallow landslides (debris flows) is coarse textured.

Locally deep seated but small collapsed till deposits total 2,920 acres in the upper Rattlesnake Watershed. These secondary mass wasting processes have not been extensive enough to totally modify the initial glacial trough landforms. Occasionally these landslides have slid in to the

valley floor creating old impoundments widening valleys and creating wet meadows and low gradient reaches. However, in the upper Rattlesnake, Dog Creek and North Fork Rattlesnake, large deep-seated landslides have slide into the valley floor causing significant stream adjustments and confinement. The affect of this interaction between landslides and stream confinement is described in the following paragraph.

In the mid to lower segments of the Rattlesnake Watershed, large deep seated landslides and landslide escarpments are a significant source for sediment delivery. These deep-seated landslides were stratified during the watershed analysis procedures. Approximately 13,796 acres of deep-seated landslides occur in the mid and lower segments of the Rattlesnake Watershed. This large deep-seated landslide occurs in the upper stem of the Rattlesnake, Three Creeks, North Fork, and around Angel Lake. These deep-seated landslides occasionally slide into the valley floor delivering sediment directly into stream systems. Once slides block stream channels, additional sediment is associated with the affect of streams attempting to readjust to this confinement. Streams continue to readjust to this confinement by

Down cutting through the toe of many landslides.

Shifting alignment and undercutting confining toe slopes creating V-notched inner gorges.

Shifting base level and eroding channel beds immediately downstream of local confinement (related to rocky slide debris).

Undermining the toe of landslides creating unstable slope conditions and triggering additional failure into the channel perpetuating the process.

During this stream adjustment, accelerated levels of sediment are being routed and delivered due to the initial landslide blocking channels.

Glacial fluvial deposits have formed fairly large terraces and outwash deposits in the mid sections of the Rattlesnake Watersheds. These outwash deposits have resulted in wider valley segments. Fluvial down cutting processes have down cut through these old deposits forming elevated terraces, which is no longer a part of the current flood plain. This form of sediment delivery is common during storm events, spring runoff, and if channels have been artificial confined by alluvial fans or deep-seated landslides.

All of these forms of sediment delivery are responsible for contributing fine sediment input. Roads can accelerate the natural rate of sediment delivery by

1. Contributing to slope instability.
2. Concentrating runoff and increasing erosion.
3. Confinement of stream channels and reducing flood plain function.

Table 13. Rattlesnake Watershed total miles of road within naturally high sediment sources

Large deep seated landslides	Small deep seated landslides	Shallow landslides (debris flows)	Valley bottom mainstem stream channels
15.4	0.7	0.1	0.6

B2. Fine Sediment (Score 3)

No quantitative sediment or turbidity data is known to exist for the Rattlesnake. Overall the Rattlesnake is judged to be functioning appropriately for fine sediment except the Little Rattlesnake and Lower Rattlesnake which are considered functioning at risk due to apparently embedded substrate, possible accelerated bank erosion, and past management activities. The Rattlesnake Watershed condition for fine sediment is rated as a 3 due to fine sediment concerns in the lower watershed.

B3. Flood Plain Function, Off-Channel Habitat and Riparian Reserves (Score 3)

The Rattlesnake Watershed is functioning appropriately except for the Little Rattlesnake. Flood Plain Function, Off-Channel Habitat and Riparian Reserves in the Little Rattlesnake sub-watershed are functioning at risk due to flood plain encroachment by the 1501 Road, apparent accelerated downcutting observed in portions of the Little Rattlesnake, past timber harvest and compaction caused by dispersed recreation in Coral and Soda Springs Meadows. The Rattlesnake is scored as a 3 because most of the watershed is functioning appropriately and the impacts to the flood plain function, Off-Channel Habitat and Riparian Reserve indicators are localized.

B4. Flow Effects (Score 3)

Flow Effects are rated as a 3. Over one-half the watershed is located within Wilderness. The headwaters Rattlesnake and Hindoo-Buck Sub-Watersheds are totally within Wilderness. The Little Rattlesnake Sub-Watershed is rated functioning at risk for flows due to possible reduced water storage capacity in Three Creeks Meadow, Coral Meadow and Soda Springs Meadow. The Little Rattlesnake Sub-Watershed is judged to be functioning at unacceptable risk for road density and location due to combination of road densities and the location of the 1501 road within the flood plain. The Lower Rattlesnake is also functioning at risk for road density.

B5. At-Risk Fish (Score 9)

The Lower Rattlesnake is considered to be a significant sub-watershed for steelhead, the headwaters Rattlesnake is significant for bull trout. Hindoo-Buck used to be considered significant for bull trout, but spawning surveys show few redds and little habitat available due to

natural barriers. The sub-watershed is no longer considered significant. While not at risk, the Lower Rattlesnake is considered significant for spring chinook and the headwaters of the Rattlesnake for west slope cutthroat. The headwaters Rattlesnake provides spawning habitat for one of two known spawning populations within the sub-basin that is not isolated by a dam. There are no barriers to connectivity between the Rattlesnake and other watersheds in the Naches Sub-Basin. Due to the relatively natural state of the habitat, the Rattlesnake Watershed provides a potential refugia for native fish populations. The Rattlesnake is rated as a 9 for at-risk fish because of significant sub-watersheds for bull trout and steelhead and due to the available habitat and pristine nature of much the watershed, it may act as a refugia for native fish. The lower portions of the watershed outside wilderness are a priority for forest and watershed restoration.

C. Wildlife

The Rattlesnake Watershed experiences high-level human use year round, however Wilderness areas provide large areas of undisturbed habitat.

C1. Wide-Ranging Carnivores

The Rattlesnake Watershed contributes a large amount of core habitat to the Naches Sub-Basin. The open road density in the Rattlesnake Watershed is low, at 0.78 mi/mi^2. A large proportion of the watershed is core habitat, consisting of approximately 60,390 acres (70.5%). A portion of the Bethel Lynx Analysis Unit is located in the Rattlesnake Watershed and has a low open road density of 0.87 mi/mi^2. There are only 39.08 miles of open road in the LAU.

C2. Late-Successional Associated Wildlife Species

Three LSR/MLSAs are located within the Rattlesnake Watershed: Rattlesnake LSR, Upper Nile LSR and Haystack MLSA, and they cover approximately 3,571 acres (4.2%). The security habitat rating for all three is low. The habitat effectiveness rating for Upper Nile LSR and Haystack MLSA is low and improves to moderate for the Rattlesnake LSR.

C3. Riparian Dependent Wildlife Species

Riparian reserves occupy approximately 12,887 acres (15.0%) of the Rattlesnake Watershed. The open road density within the riparian reserves is moderate, 1.04 mi/mi^2.

C4. Ungulates

The Rattlesnake Watershed provides a fair amount of ungulate winter range habitat. This watershed contains 5,077 acres (5.9%) of winter range with a high open road density of 2.2 mi/mi^2.

C5. Unique Habitats

Unique Habitats display a moderate level of diversity and abundance in the Rattlesnake Watershed, covering 23,624 acres (27.5%). Table 14 summarizes the availability of unique habitats in the RattlesnakeWatershed.

Table 14. Availability of unique habitats in the Rattlesnake Watershed

Unique habitat	Acres	% of watershed
Avalanche	890	1.0
Grassland	777	0.9
Lithosol	26	0.03
Meadow	690	0.8
Meeks Table RNA	69	0.08
Rock	19,880	23.2
Shrubland	969	1.1
Snowfield	8	0.01
Wetland	315	0.4

II. Analysis

Human Use

The objective of the human use portion of the roads analysis is to identify the level of importance the road system is to the human use activities in the particular sub-basin or watershed and to further identify the primary activities or combination of activities the road system is used for. Social values vary greatly among users. Further, users with similar interests will have differing perceptions of what constitutes appropriate access. It is not possible to satisfy every individual or group of individuals, nor is it possible to identify what people will desire tomorrow or into the next decade. It is possible to observe trends and at least make some qualitative estimates of what the future needs may be. It is possible to observe trends and at least make some qualitative estimates of what the future needs may be, but will not attempt to make quantitative predications of future needs.

There is a great deal of overlap in social needs so it is important to keep in mind, the scale of population of users being considered; is it small scale/local community, medium scale/multiple community, large scale/regional, or very large scale/national importance? This consideration will help the decision maker determine whether the management of a particular road segment will have a direct or indirect effect on the user.

The human use factors are grouped into broad categories relating to the amount of flexibility the decision maker has, whether the value is expected to be of local, regional or national scale, the current use pattern, and desired future condition. The rating criteria are described in detail in Appendix A. In this analysis, segments with scores of 30 and above were given a high priority, which means there is a "high" need to keep that segment some type of passenger car access. Roads with a score of 20 to 29 received a moderate priority rating and roads with a score of 19 and below were given a low priority rating. All road segments received a "high" score for the ROS Class criteria so this criterion is not discussed in detail.

The general feeling, based on comments from public meetings and letters received to date, is that people want to see access maintained for a variety of activities. Comments suggest that maintenance levels can be adjusted as long as access is not eliminated. Some comments were for a higher level of maintenance on certain roads and others stated they would like to see some roads gradually degraded to a lower maintenance standard. One comment emphasized consideration for disabled persons, another pointed out that access should not be limited to the "financially and physically elite", but should be available to all people.

Aquatics

Road segments were placed into either high, medium, or low priority for treatment based upon the Aquatic Analysis described in detail in Appendix B. The priorities were determined based upon the aquatic score for the segment and then verified by local knowledge. High priority segments generally are located adjacent to streams in a significant sub-watershed for an at risk

species. These segments are usually delivering sediment to the streams, are on unstable lands, or confining the flood plain, and are in the greatest need of management. Passage barriers to some life stage of at risk species were often present. High priority road segments scored 29 or above. Medium priority road segments have some erosion problems, such as delivering sediment into streams, or were contributing to riparian degradation, but the problems were either being managed or the potential for adverse impacts was not as great as the high risk. These are segments where some work is needed, but are a lower priority than the high risk. Medium priority segments scored between 20 and 28. Low priority roads scored under 20 and were low risk because it was felt potential direct delivery of sediment and adverse impacts to at risk species was low due to location and current conditions of the roads. The low risk road segments were generally on lands with a low geologic hazard rating.

The high priority road segments are discussed in this narrative. Scores and notes for all road segments are in Appendix B.

Wildlife

This segment summarizes the results for the five roads analysis categories with regard to wildlife in the Naches Sub-Basin: wide ranging carnivores, late successional species, riparian dependent species, ungulates and unique habitats. Road segment priority ratings were determined by summing the category scores (see Appendix C) derived from the Wildlife Roads Analysis Procedure described in detail in Appendix C.

High priority segments usually offered the greatest potential for improving core habitat and ungulate winter range habitat and were generally located away from areas of high road density. Some element of Late Successional Association and/or Riparian Reserve restoration contributed as well. High priority segments scored greater than 20 points.

Medium priority segments would usually have one element of strong potential for habitat improvement, often core or winter range habitat, and moderate to low potential for habitat improvement in the remaining categories. Medium priority segments scored 10 to 20 points.

Low priority segments were often characterized by either excellent habitat conditions or very limited restoration opportunities due to current road conditions, such as pavement and high human use. These road segments scored less than 10 points.

Because the roads cover a large area and a variety of habitats, there is not one consistently outstanding category. Instead, various combinations contributed to the overall rating. The following is a summary of potential restoration opportunities by analysis component, with an emphasis on segments with the greatest potential habitat improvement.

Tieton Watershed

A. Human Use

In general the arterials and collector roads in this watershed are rated as highly important for human uses. Most of the roads in this watershed are being used for range administration. The

need for timber access varies from road to road. Many outdoor recreation activities occur so the consensus of public comments was to maintain access, though levels of maintenance could be adjusted. Fire protection is an important consideration on nearly all of these roads. Noxious weed treatment is also dependent on access though road standards and maintenance levels can be adjusted and still accommodate these activities.

A human use rating of high was arrived at for most roads in the watershed. Roads 1010, 1040, 1202, and the upper segment of 1205 received moderate ratings.

Some adjustments could be considered and meet current needs for access in the watershed, they were identified as follows:

Part of road 1050 could be considered for conversion to 4x4 route
Road 1200570 could benefit from winter closure
Road 1040 would not be needed following completion of the Smokey Timber Sale, and so could be considered for decommissioning

B. Aquatics

1040 road. The road crosses unstable lands and has experienced chronic sediment problems. Potential for failures and sediment delivery directly into Corral Creek and the bull trout spawning reach on the South Fork Tieton River.

1050 road. A section of the road has slid creating a temporary closure. The road has potential to continue to slide and deliver a large amount of sediment into the South Fork Tieton bull trout spawning reach.

1202 road. Road crosses landslide terrain. While the portion of the road with erosion problems drains into the south Fork downstream of Blue Slide (substrate sediment is very high in this reach of the South Fork naturally due to Blue Slide) there is potential for accelerated delivery of large amounts of additional sediment due to the road. The road also impinges on the floodplain function of Fish Creek.

1306 road. Chronic sediment delivery into Thunder and Wildcat Creeks due to location and crossings. Crossing on Thunder Creek is undersized. Wildcat Creek may support steelhead and has a native west slope cutthroat trout population.

1308 road. Segment of this road is adjacent to bull trout spawning on Indian Creek. Main impact is potential poaching as spawning fish can be seen from the road.

C. Wildlife

The road density in the Tieton Watershed is moderate at 1.544 miles/mile^2. Of the 22 road segments in the Tieton Watershed; 11 (50%) received a high rating for potential improvement, nine (41%) received a moderate rating for potential for habitat improvement and two (9%) received a low rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve conditions for target species by improving core is moderate to high. However, access for recreation, wilderness trails and mixed land ownership limit opportunities for restoration. Five notable exceptions include road 1050, which is already closed due to a slump in the road, roads 1010 and 1205, which do not provide established recreational access, and roads 1302 and 1306, which provide access to several spurs and tributary roads. Altering the use of these could greatly improve core.

C2. Late-Successional Associated Species

Numerous roads run through the Tieton Late Successional Reserve (LSR), Russel Ridge LSR, Rattlesnake LSR and Lost Lake Managed Late Successional Area (MLSA). Four (18%) roads actually bisect either an LSR or MLSA, while 14 (64%) roads intersect either an LSR or MLSA at some point. The four bisecting roads, 1000, 1010, 1201, 1306 present the greatest potential for improving security habitat and habitat effectiveness. This would result in progress towards security habitat and habitat effectiveness goals identified in the Wenatchee National Forest LSR assessment.

C3. Riparian-Dependent Species

Potential for restoring riparian habitat and habitat connectivity along riparian areas is high in the Tieton Watershed as ten (45%) roads are found near or in riparian areas. Road 1308 begins in the Tieton Watershed, but the majority is located in the Upper Tieton Watershed. This road is an important issue as it runs along a bull trout stronghold. Additional opportunities for improvement exist along roads 1010 and 1050 (as described above in the Wide-Ranging Carnivores section), road 1202, which is currently sloughing into a riparian area, and road 1200711, which run through a wetland. Several other road segments are located at higher elevations. The Aquatic Analysis may more accurately address the issues surrounding the riparian areas.

C4. Ungulates

There is a great deal of ungulate habitat near the roads within the Tieton Watershed. Six (27%) of the roads in the Tieton Watershed have high potential to enhance habitat effectiveness of winter ranges, young rearing areas and migration routes for ungulates. Roads 1201, 1202, 1302, and 1500312 fragment winter range areas and have the greatest potential for enhancing habitat effectiveness. Both ends of road 1500 are also located in winter range. It is important to note that winter human recreational use is also heavy in these areas. The remaining roads primarily affect migration, calving and fawning areas, while five (23%) roads are believed to have no direct effect.

C5. Unique Habitats

Ten (45%) of the roads in the Tieton Watershed are rated with moderate to high density/frequency of unique habitats. The unique habitats have a moderately strong influence on the ratings and should be looked at in greater detail in the watershed scale analysis.

In summary, the ratings within the Tieton Watershed tend to be driven by core availability for

wide-ranging carnivores, habitat for Late Successional Species and ungulate winter range habitat.

Upper Tieton Watershed

A. Human Use

In the Upper Tieton the majority of roads received a moderated rating for human use. While all ranked high for level of public use, the rankings for access, resource management and economics varied. Roads 1200 and 1200740 provide necessary access for other agencies. Except for road 1207, most were important for resource management. Economic values are generally lower in this watershed, with the exception of road 1200740, which was important for timber, special forest products and fire protection.

B. Aquatics

The discussion for this section is included in the Aquatics discussion under the Tieton Watershed.

C. Wildlife

The road density in the Upper Tieton Watershed is low at 0.546-miles/mile^2. Overall the watershed appears to be in good condition. Of the four road segments in this watershed; three (75%) received a moderate rating for potential improvement of habitat and one (25%) received a low rating for potential improvement.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve core is low to moderate as a result of good current conditions.

C2. Late Successional Associated Species

Potential for improving habitat for late successional species is moderate. Small sections of road are located in the Tieton LSR, but they do not seem to be a major habitat concern.

C3. Riparian-Dependent Species

The potential to restore riparian habitat and habitat connectivity is low for most of the Upper Tieton Watershed. As mentioned in the Tieton Watershed analysis, the most important riparian issue is the bull trout stronghold found on road 1308.

C4. Ungulates

The potential to enhance habitat effectiveness for ungulates is low. Only road 1200 runs through migration, calving or fawning habitat. However, road 1200 is paved and does not present a realistic habitat restoration opportunity.

C5. Unique Habitats

Unique habitats are not prevalent in the Upper Tieton Watershed and provide only low to moderate influence on the ratings.

In summary, the ratings within this watershed tend to be driven by potential for core improvement. Because there are few roads in the Upper Tieton Watershed, this watershed tends to be in better condition than the others within the sub-basin scale.

Oak Creek Watershed

A. Human Use

The arterials and collector roads in Oak Creek were all rated very important for human uses. Legal access requirements, resource management needs, importance for public access, and economic consideration all ranked at the top.

From a human use perspective no changes were recommended.

B. Aquatics

1401 road. The road is directly adjacent to the stream restricting floodplain function in Oak Creek. Oak Creek may support steelhead and does support a population of native west slope cutthroat trout. Bull trout may be present based on an observation of one individual fish.

C. Wildlife

The road density in the Oak Creek Watershed is moderate at 1.604 miles/mile^2. Of the four road segments in this watershed; three (75%) received a high rating for potential habitat improvements and one (25%) received a moderate rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve core is moderate to high. The upper portion of road 1400 provides the greatest potential for improvement. However, access for recreation, wilderness trails and mixed land ownership will again limit opportunities for restoration.

C2. Late-Successional Associated Species

Overall the potential to improve security habitat and habitat effectiveness in the LSR is low. None of the roads in the Oak Creek Watershed directly impact late successional habitat.

C3. Riparian-Dependent Species

The potential to restore riparian habitat and connectivity in the Oak Creek Watershed is moderate. Each of the roads influences a riparian area, either lake or stream, with the exception of the upper part of road 1400.

C4. Ungulates

Three (75%) of the roads in the Oak Creek Watershed have moderate to high potential to improve habitat effectiveness for ungulates. Roads 1400 (lower), 1400235 and 1401 all run through winter range.

C5. Unique Habitats

The unique habitats are prevalent throughout the watershed and have moderate to high influence on the ratings, making further analysis necessary at the watershed scale.

In summary, the ratings within the Oak Creek Watershed tend to be driven by habitat effectiveness for ungulates and presence of unique habitats, and to a slightly lesser degree by riparian dependent species and core availability for wide-ranging carnivores.

Bumping-American Watershed

A. Human Use

In the lower Bumping Watershed, legal access, resource protection and public access are critically important. The upper part of the watershed remains important for public access, though legal access is not an issue and resource management needs are much less important. Economic considerations ranked quite low for the entire drainage.

The current maintenance levels are about right from the human use perspective.

B. Aquatics

1800 road. This road is located within the flood plain of the Lower Bumping. In the past maintenance crews would waste material from ditch cleaning directly into the Bumping River. This practice is no longer used; all material is hauled to designated dump sites. Crossing of Goat Creek is a barrier to steelhead.

1808 road. Material routed down first order "source" channels is deposited on road, reducing gravel recruitment to Deep Creek bull trout spawning areas. Crossing on Deep Creek is a barrier to juvenile bull trout, but it should be noted that a natural falls barrier is present about 400 feet upstream.

C. Wildlife

The road density in the Bumping-American Watershed is low at 0.437 miles/mile^2. Of the three road segments in this watershed; one (33%) received a high rating for potential habitat improvement and the remaining two (67%) received a moderate rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve core is moderate to low. County road maintenance and mixed land ownership limit core improvement.

C2. Late Successional Associated Species

All three roads are found within the Bumping LSR, but have low to moderate potential for improving security habitat and habitat effectiveness.

C3. Riparian-Dependent Species

Only the lower segment of road 1800 is frequently in or adjacent to riparian zones, presenting the highest potential for restoring riparian habitat and connectivity. This rating drives the high rating for the entire Bumping-American Watershed.

C4. Ungulates

There is little to no potential for enhancement of ungulate habitat effectiveness.

C5. Unique Habitats

Unique habitats are moderately present but should be looked at in greater detail at the watershed scale.

In summary, Bumping-American Watershed does not provide many opportunities for improvement with regard to wildlife.

Naches Main Stem Watershed

A. Human Use

Generally roads in the Naches Main Stem ranked high in importance for human uses and to maintain access. A number of road segments have cost share and easements but others have no legal encumbrances. Resource management needs are high in almost every part of this drainage that is directly served by the arterials and collector roads. Public access ranked out high for every segment, except road 1607 and 1712. These 2 roads are used primarily for hunting and receive some use for pleasure driving.

The current level of maintenance was considered about right from a human use perspective.

B. Aquatics

1611 road. Road impinges on the flood plain of Orr Creek, a tributary to Nile Creek. The Nile likely supports steelhead. An undersized crossing is confining a depositional channel. There is a concern for potential erosion and sediment delivery to the Nile.

1702 road. Road is adjacent to Rock Creek. The road has confined the channel and erosion from the road is delivered directly to Rock Creek. Rock Creek likely supports steelhead, at least in the lower reach of the stream.

1704311 road. Rated high due to crossing on Lost Creek which is a barrier to steelhead and chronic sediment input from road surface and fill slopes.

1708 road. Road confines stream channel and is a chronic sediment problem.

1709300 road. Road is adjacent to the Naches River. Chronic raveling and surface erosion of cut and fill slopes delivers sediment to Naches River. Road provides dispersed recreation access onto floodplain resulting in compaction loss of riparian vegetation and possible loss of high flow refuge habitat due to loss of vegetation.

C. Wildlife

The Main Stem Naches Watershed is heavily roaded with a road density of 2.576 miles/mile^2. Of the 24 road segments in this watershed; 15 (63%) received a high rating for potential improvement, eight (33%) received a moderate rating for potential habitat improvement and one (4%) received a low rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve core is high. Eleven (46%) road segments have high potential for core improvement while eight (30%) road segments have moderate potential for core improvement. In this situation, eliminating or altering road use will affect a substantial number of lower maintenance lateral roads, thereby greatly improving core. For example, roads 1607 and 1707 are two notable possibilities. Road 1707 is already closed on the south end. There is a great deal of potential for core improvement with the Main Stem Naches Watershed, however, high levels of human use, including paved road segments, recreation, wilderness access and mixed land ownership limit the potential for restoration.

C2. Late Successional Associated Species

Seventeen (71%) road segments are located within the Haystack MLSA, Mill Creek MLSA and Nile LSR within the Main Stem Naches Watershed. Four of those roads bisect an LSR or MLSA and therefore present the greatest potential to improve security habitat and habitat effectiveness. Roads 1600 and 1611 bisect the Haystack MLSA. Road 1605 bisects the Nile LSR. Road 1708 splits one side of the Mill Creek MLSA.

C3. Riparian-Dependent Species

Twelve (50%) of the roads in the Main Stem Naches Watershed present problems within riparian areas. Roads 1611, 1703, 1704, 1704311, 1708 and 1709300 are all found within riparian areas and rank the highest for potential to restore riparian habitat and connectivity.

C4. Ungulates

The high road density within the Main Stem Naches Watershed creates high potential for enhancing habit effectiveness for ungulates. Eight (33%) roads bisect winter range while seven (30%) other roads are located within migration, calving and/or fawning habitat.

C5. Unique Habitats

Fifteen (63%) of the roads in the Main Stem Naches Watershed are ranked moderate to high density and frequency. Unique habitats are rather prevalent and should be looked at in greater detail at the watershed scale. The unique habitats have a strong influence on the ratings.

In summary, the high road density and large area of the Main Stem Naches Watershed results in ratings that are driven by all possible categories. There is great potential for habitat improvement and restoration, however, mixed ownership and human access needs may reduce the ability to restore habitats.

Little Naches Watershed

A. Human Use

Roads in the Little Naches are generally considered very important for human use. About half the roads have cost share agreements, giving them a high ranking for legal access needs. The other half has no legal encumbrances and rank low. Resource needs vary widely depending on the need for fire protection and silviculture treatments. Most were considered important for timber management.

From a human use perspective, the current levels of maintenance are considered to be about right. No changes were suggested.

B. Aquatics

1900 road. Road has constricted stream in places and cut-off flood plain and off channel habitat. Management actions have been initiated to reduce damaged to riparian vegetation and stream banks but maintenance of improvements is required. Crossings on Jungle and Pileup Creeks are likely barriers to juvenile salmonids.

1911 road. Raw, raveling cut slopes are a chronic sediment source to Bear Creek and the Little Naches. Sediment is a management concern in the Little Naches.

C. Wildlife

The road density in the Little Naches Watershed is moderate at 1.297 miles/mile^2. Of the 12 road segments in the Little Naches Watershed; seven (58%) received a high rating for potential improvement, four (33%) received a moderate rating for potential habitat improvement and one (9%) received a low rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the highest potential for improving core habitat exists along roads that don't provide recreational access or are located on Plum Creek land (assuming Plum Creek's cooperation with regard to gating roads). These roads include: 1901, 1906, 1911, 1913, 1920 and the upper segment of 1900. The remaining five roads have high access and recreation needs.

C2. Late-Successional Associated Species

The 12 roads within the Little Naches Watershed are split evenly among high, moderate and low potential for improving security habitat and habitat effectiveness. Most roads are located within the Crow MLSA, the Manastash Ridge LSR and the Milk Creek MLSA. Roads 1900, 1901 and

1902 have the greatest potential for improvement. Road 1900 is paved and the lower portion runs through the Milk Creek MLSA. Roads 1902 and 1920 run through the Crow MLSA. The upper ends of roads 1900, 1901, 1911, and 1913 are in the Manastash Ridge LSR. Road 1903 is on the edge of the Manastash LSR, while Road 1906 is not in an LSR or MLSA.

C3. Riparian-Dependent Species

The road segments in the Little Naches Watershed generally present low to moderate potential for riparian habitat restoration and connectivity. However, portions of roads 1906, 1911, and 1913 cross or run through riparian areas.

C4. Ungulates

The Little Naches Watershed provides little winter range affected by these roads. However, these roads do affect limited migration, calving or fawning habitat for ungulates. Therefore, there is generally a low to moderate potential for improvement.

C5. Unique Habitats

The unique habitats are moderately frequent within the watershed. Five (42%) road segments have moderate to high density/frequency of unique habitats.

In summary, the ratings within the Little Naches Watershed tend to be driven by core availability for wide-ranging carnivores and habitat security/habitat effectiveness for Late Successional Associated Species. It is important to note human access needs may limit habitat restoration opportunities at the sub-basin scale.

Rattlesnake Watershed

A. Human Use

Arterial and collector roads in the Rattlesanke were rated in the medium to high importance for human use. Legal access considerations are generally associated with road easements. Resource management issues generally ranked medium to high. Timber, special forest products and range are all important throughout this watershed, as were silviculture treatment needs. Fire protection and noxious weed treatments are also important considerations. Public use is uniformly important across the drainage. As a result overall human use rated as high except where there were no legal encumberances.

It was suggested the maintenance levels could be reduced on roads 1500190, 1500199, and 1501 without having a negative effect on any of the current human uses.

B. Aquatics

1501 road. Little Rattlesnake supports steelhead. Road diminishes floodplain function, has barriers to westslope cutthroat trout and road provides access to riparian meadows, which has resulted in compaction and damage to riparian vegetation.

C. Wildlife

The road density in the Rattlesnake Watershed is low at 0.775 miles/mile^2. Of the seven road segments in the Rattlesnake Watershed; four (57%) received a high rating for potential habitat improvement and three (43%) received a moderate rating.

C1. Wide-Ranging Carnivores

For wide-ranging carnivores, the potential to improve core habitat is moderate to high, as there is good habitat available, especially along roads 1501 and 1503. However, access for recreation, wilderness trails and mixed land ownership limit the potential for restoration.

C2. Late-Successional Associated Species

Overall the potential to improve security habitat and habitat effectiveness in the LSR is moderate. Road 1501 bisects the Rattlesnake LSR, while road 1500 intersects portions of the Rattlesnake LSR.

C3. Riparian-Dependent Species

The potential to restore riparian habitat and connectivity in Rattlesnake Watershed is low, with one exception. Road 1501 likely affects the riparian areas associated with Little Rattlesnake Creek.

C4. Ungulates

Five (71%) of the roads in the Rattlesnake Watershed have moderate to high potential to improve or restore habitat effectiveness for ungulates. Road 1502 is located in the middle of winter range and runs through migration, calving and fawning habitat. Road 1501 is also found in migration, calving and fawning habitat. Road 1500190 impacts both winter range and habitat for other ungulates, particularly mountain goats.

C5. Unique Habitats

The unique habitats are present on all roads in the watershed, except for 1503. As a moderate to high influence on the ratings, further analysis is necessary at the watershed scale.

In summary, the ratings within the Rattlesnake Watershed tend to be driven by core availability for wide-ranging carnivores, habitat effectiveness on ungulate winter range and presence of unique habitats.

III. Recommendations

The range of recommended treatments or strategies fit into five general categories ranging from major improvements to decommissioning. The five categories are: major repair or improvement, minor repair or improvement, leave as is, lower maintenance requirements, stabilize then eliminate maintenance requirements, and decommission. Major repairs can include but are not limited to relocation, replacing fish barrier culvert, or seasonal closure. Minor repairs can include, but are not limited to, minor surfacing or grading work, drainage improvements such as adding cross drains or drain dips, or seasonal closures. "Leave, as is" means the current maintenance standards would be left with no change and no work is needed. "Lower maintenance requirements" strategy would reduce the current maintenance standard to the next lower standard. For example: Maintenance Level 3, maintained for passenger cars, would be reduced to a Maintenance Level 2, which is maintained for high clearance vehicles. The "stabilize then eliminate maintenance" strategy would involve stabilizing the road, for example by out sloping, installing water bars, removing culverts where possible, or just inspecting the road periodically for any damage. For roads with recommended strategies of lowering the maintenance standard or eliminating maintenance after the road stabilized, users will probably not notice an immediate change. The road will be allowed to reach the new standard over time. The decommissioning strategy can involve a range of treatments from ripping and seeding the surface to full obliteration. These categories are described in greater detail in Appendix D.

Some type of change was recommended for about half of the roads analyzed. The changes ranged from major improvements to decommissioning. Of the 34 recommended changes, 18 are to make an improvement of some type to mitigate resource impacts while maintaining passenger car access. This accounts for 82.7 miles, however in many cases the repair or treatment is at a specific location and is not the full length of the road. Eleven of the recommended treatments are to preserve the access, but reduce the level of maintenance currently applied to the road. This would result in lowering the maintenance standard on approximately 46 miles, which would make them accessible by high clearance vehicles. One recommended road treatment was to permit use of the road but to eliminate the maintenance requirements on the road after it was stabilized. This strategy would cover 4.7 miles. It was felt there would be minimal if any resource impacts due to the location of the road on a rocky ridge top. Finally the draft strategy recommended for three road segments, totaling 17.4 miles, was some type of decommissioning. Only the roads with a recommended change in treatment or strategy are listed in the following tables. A complete listing of all roads analyzed with recommended strategies is included as Table D-2 in Appendix D.

If all the recommended strategies were implemented fully there would be an annual saving of approximately $136,000 in required maintenance across the sub-basin. There would also be a savings of the dollars not spent on unidentified deferred maintenance for the roads in the "leave as is" through "decommission" categories. However, more than that amount would be needed to fully implement these strategies. The specific projects needed to implement these strategies are not known in enough detail at this time to develop any cost estimates.

Minimum Affordable Road System

The Forest Service defines the minimum affordable road system as the miles of road by maintenance level that can be maintained to full standard with the anticipated maintenance funding. Based on forest average maintenance costs, it would require approximately $2,220,000 annually to maintain all of the system roads in the Naches Sub-basin. These values do not include the costs for the identified deferred maintenance, the maintenance needed to bring the road back up to the standard described in the Forest Service Manual, or the funds needed to improve fish passage by repairing or replacing barrier culverts. In Fiscal Year 2000 approximately $310,000 (14% of the estimated annual need) was expended for maintenance on the roads in the Naches Sub-basin. However, rather than maintaining a small percentage of the roads to full standard, the work was distributed over a greater mileage to address high priority needs.

Budget projections indicate that funding for road maintenance will continue at current levels for the foreseeable future. Consequently, $210,000 was selected as the planned amount for the minimum affordable road system for the sub-basin. Based on that funding level and the average costs per mile by maintenance level, the following table displays the extremes in the range of potential road management scenarios. Option A shows the number of miles of road that can be maintained to standard starting with the level 2 (high clearance vehicle) roads first. The number in parenthesis is the percent of the total system roads in the sub-basin that would be maintained to standard. Option B shows the number of miles of road that can be maintained to standard starting with the level 3-5 (passenger vehicle) roads first. From a practical standpoint, the minimum affordable system would likely be a combination of arterials and collectors maintained for passenger cars, and local roads maintained for high clearance vehicles.

Table 15. Minimum affordable road system options

Maint. level	Option A		Option B	
	mi.	(% of total)	mi.	(% of total)
ML 2 (high cl.)	307	(34)	0	(0)
ML 3-5 (pass.)	0	(0)	82	(23)

This analysis demonstrates there are many more miles of roads than can be fully maintained with the expected funding. However, a rapid reduction in accessible road mileage is not acceptable to a large segment of forest users, would not meet agency management access needs and would incur significant expenses to properly implement.

As stated above, this analysis did not recommend any road segments be decommissioned. Future studies that will analyze the local roads, (those maintained for high clearance vehicles) have the potential to recommend decommissioning some roads in an effort to adjust the size of the road system.

Tieton Watershed

Within the Tieton River Watershed three roads received a recommendation of “major repair or

improvement," three roads received a recommended strategy of "minor repair, improvement or seasonal restrictions", and one road was given the recommendation to "lower the maintenance standard". Finally, decommission was the recommended strategy on three roads All other roads analyzed in the drainage received "leave as is" recommendations. Table 16 summarizes the recommendations.

The recommended major repair strategies for Spencer Creek, Wildcat and Indian Creek roads include relocation and reconstruction considerations to address the high aquatic and wildlife ratings.

The recommendation for Spencer Creek (1202000) is to consider reconstruction and drainage work for the first half mile of the road to address the stability concerns.

The recommendation to consider for the Wildcat and Indian Creek roads is to relocate the trailheads that are located at the ends of each road. The recommendation is to address aquatic and wildlife concerns that exist at the ends of the road.

The strategy recommended for Milk Creek (1200570) is to consider a winter season restriction to address the wildlife issues.

On the Peninsula (1200711) road the recommendation is to maintain current access, but try to address the meadow encroachment concerns. The minor repair on the Pinegrass road (1205000) is to address drainage concerns on the steep grade sections, so improved drainage should be considered.

The recommended strategy for Short and Dirty road (1010) is to maintain access but reduce the maintenance standard to high clearance vehicles. This is to address wildlife issues.

On Corral Creek (1040000) and Discovery Creek (1050000) the draft recommended strategy was some type of decommissioning; however, after quick review of potential cost to implement the recommendation, the final strategy is to carry both a major repair alternative that would address the aquatic concerns and a decommission alternative forward to the decision stage. In the decision analysis an economic analysis should also be conducted to provide more detailed information for the decision maker.

The recommended strategies for the upper portion of Spencer Creek (1202000 above the 1203 junction) is also decommission. There is currently a year round closure by a gate so this should have little impact on current public use. This is to address aquatic and wildlife concerns.

Table 16. Tieton Watershed recommendations

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Spencer Creek	1202000	3.4	H	H	H	Major repair	Major repair
Wildcat	1306000	3.8	H	H	H	Major repair	Major repair

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Indian Creek	1308000	2.8	H	M	M	Major repair	Major repair
Milk Creek	1200570	2.8	M	H	H	Minor repair	Minor repair
Peninsula	1200711	3.9	M	M	H	Minor repair	Minor repair
Pinegrass	1205000	3.1	M	M	M	Minor repair	Minor repair
Short & Dirty	1010000	3.8	M	H	M	Lower maint.	Lower maint.
Corral Creek	1040000	5.7	H	M	L	Decomm.	See discussion
Discovery Creek	1050000	5	H	H	M	Decomm.	See discussion
Spencer Creek	1202000 (above 1203)	6.7	H	H	M	Decomm.	Decomm.

Upper Tieton Watershed

Within the Upper Tieton Watershed two roads received a recommendation of "major repair or improvement." All other roads analyzed in the drainage received "leave as is" recommendations. Table 17 summarizes the recommendations.

The recommended major repair strategy for the North Fork Tieton road (1207) is to try to reduce concerns at the North Fork Tieton stream crossing. One of the alternatives considered should be replacing and enlarging the existing culvert. The recommended minor repair strategy for the Clear Lake road (1200740) would be to look at dust mitigation alternatives to improve air quality and improve the users experience.

Table 17. Upper Tieton Watershed recommendations

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
North Fork Tieton	1207000	4.9	M	M	M	Major repair	Major repair
Clear Lake	1200740	1.8	L	L	H	Minor repair	Minor repair

Oak Creek Watershed

Within the Oak Creek Watershed one road received a recommendation of "major repair or improvement," and one road received a recommended strategy of "minor repair, improvement or seasonal restrictions." All other roads analyzed in the drainage received "leave as is" recommendations. Table 18 is a summary of the recommendations.

The recommended minor repair strategy for the upper segment of the Oak Creek road, above the Bear Lake road junction (1400235) is to install a gate for a seasonal closure to address the high wildlife concerns. The high Human Use rating reflects the use below this junction. The use above this junction is just administrative. The major repair recommendation is to consider relocating the portion of the road adjacent to the stream.

Table 18. Oak Creek Watershed recommendations

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Oak Creek	1400000	1.6	L	H	H	Minor repair	Minor repair
South Fork Oak Creek	1401000	7.8	H	H	H	Major repair	Major repair

Bumping-American Watershed

Within the Bumping-American Watershed one road received a recommended strategy of "minor repair, improvement or seasonal restrictions." All other roads analyzed in the drainage received "leave as is" recommendations. Table 19 summarizes the recommendations.

The recommended minor repair strategy for the Deep Creek road is to address some aquatic concerns about the side channels that parallel the road just before the Deep Creek stream crossing. The recommendation is to look to improve the road drainage so it does not run directly into the side channels.

Table 19. Bumping-American Watershed

Road name	FS rd. #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Deep Creek	1808000	3.6	H	M	M	Minor repair	Minor repair

Naches Main Stem Watershed

Within the Naches Main Stem Watershed two roads received a recommendation of "major repair or improvement" four roads received a recommended strategy of "minor repair, improvement or seasonal restrictions," two were given the recommendation to "lower the maintenance standard" and one road was given a recommendation to eliminate maintenance after stabilizing the road. All other roads analyzed in the drainage received "leave as is" recommendations. Table 20 is a summary of the recommendations.

Table 20. Naches Main Stem Watershed

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Orr Creek	1611000	8.3	H	H	H	Major repair	Major repair
Milk Creek	1708000	10.6	H	H	H	Major repair	Major repair
Clover Way	1605000	9.5	L	H	M	Minor repair	Minor repair
Church	1704311	1.2	H	M	M	Minor repair	Minor repair
To Boulder Cave	1706200	0.8	M	M	M	Minor repair	Minor repair
Road to Halfway Flat Campground	1709300	2.2	H	M	H	Minor repair	Minor repair
Gold Creek	1703000 (above 1705)	10	M	H	H	Lower maint.	Lower maint.
Pine Creek	1707000	6.4	M	H	M	Lower maint.	Lower maint. Decom ½ mile
Clemans	1712000	4.7	L	H	M	Elim. Maint.	Elim. Maint.

The recommended strategy for both Orr Creek (1611000) and Milk Creek (1708000) was a major repair to address both aquatic and wildlife issues.

On Orr Creek consider a larger culvert at the first crossing or possibly to relocate the road.

On Milk Creek consider traffic controls at the upper meadows and stability measures on the upper portion of the road.

On Clover Way (1605000), Church road (1704311), the road to Boulder Cave (1706200) and the road to Halfway Flat Campground (1709300) minor repairs were recommended. Culvert concerns were the issues on Church road and 1706200, while it was road drainage improvements for Clover Way and 1709300. Dust Control is also recommended for Church road.

Lowering the maintenance standard to high clearance vehicles is the recommendation for Gold Creek (1703000) above the junction with Spring Creek road (1705) and Pine Creek (1707000). It was recommended the first approximate ½ mile (from the 410 junction to the pit site) be decommissioned due to estimated cost to repair.

The recommended strategy for Clemans (1712000) is eliminating maintenance after the road is stabilized. Currently it is very difficult to maintain this road due to the rocky conditions. There are no aquatic concerns due to the ridge top location of this road.

Little Naches Watershed

Within the Little Naches Watershed, two roads received a recommended strategy of "minor repair, improvement or seasonal restrictions", and five were given the recommendation to "lower the maintenance standard." All other roads analyzed in the drainage received "leave as is" recommendations. Table 21 summarizes the recommendations.

There were two roads in this drainage with minor repair strategy recommendations; they were the Little Naches road (1900) and Bear Creek (1911) to address aquatic concerns. On the Little Naches road the repairs were to consider replacing the culvert at Jungle Creek and drainage improvements around the Horsetail Falls area. All the other recommended changes were to maintain access but reduce the maintenance standards to high clearance vehicles to address wildlife issues. The roads are listed in the table below.

Table 21. Little Naches Watershed recommendations

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Little Naches	1900000	14.5	H	H	H	Minor repair	Minor repair
Bear Creek	1911000	6.7	M	H	H	Minor repair	Minor repair
Quartz Creek	1901000 (above 1903)	5.9	L	H	H	Lower maint.	Lower maint.
Huckleberry FC	1902865	0.5	L	L	L	Lower maint.	Lower maint.
South Fork Little Naches	1906000	4.8	M	H	M	Lower maint.	Lower maint.
Pyramid Pass	1913000	1.6	L	H	H	Lower maint.	Lower maint.
Fifes Ridge	1920000	10.1	L	M	H	Lower maint.	Lower maint.

Rattlesnake Watershed

Within the Rattlesnake Watershed four roads were given the recommendation to "lower the maintenance standard". All other roads analyzed in the drainage received "leave as is" recommendations. Table 22 summarizes the recommendations.

All of the recommended strategy changes in this watershed are to reduce the maintenance standards. The changes were recommended to help with wildlife concerns. It was also recommended for the Timberwolf Mountain (1500190) to address safety concerns at the old lookout area. On the Little Rattlesnake road (1501000) the rating for Aquatics and Human Use are influenced greatly by the lower portion of the road that is below the Devils Canyon road (1503000) junction. The value in the table reflects the rating for the whole road. Therefore the recommendation is to maintain the current standard on the lower portion of the road below the 1503 junction, then reduce the maintenance standard on the upper portion.

Table 22. Rattlesnake Watershed recommendation

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Timberwolf Mtn.	1500190	2.7	L	H	M	Lower maint.	Lower maint.
Cash Prairie	1500199	2.1	L	M	M	Lower maint.	Lower maint.

Road name	FS rd #	Seg. length (mi)	Aquatic rating	Wildlife rating	Human use rating	Draft recom. mgmt.	Final recom. mgmt.
Little Rattlesnake	1501000 (above 1503)	10.3	H	H	H	Lower maint.	Lower maint.
Mt. Aix Vista	1504000	2.8	L	M	M	Lower maint.	Lower maint.

Watershed Analysis Priority

During the analysis process the team reviewed the condition and uses of the watersheds as a whole to determine a priority recommendation for the completion of the watershed scale analyses. The team looked at the existing conditions and impacts within the watershed, types of use, anticipated future projects (such as dry site management or fuels planning), and the ability or opportunity to make changes. The priorities are shown in Table 23.

Table 23. Watershed analysis recommendations

Watershed	Human use rank	Wildlife rank	Aquatic rank	Composite rating
Tieton	M	H	L	M
Upper Tieton	H	L	H	H (3)
Oak Creek	M	M	L	L
Bumping-American	L	L	L	L
Naches Mainstem	H	H	M/H	H (2)
Little Naches	H	H	H	H (1)
Rattlesnake	M	M	M	M

The Little Naches Watershed was given the highest priority because of the high Human Use, it is a designated Key Watershed, and the high potential to improve wildlife habitat. The Main Stem Naches is only slightly below the Little Naches because all the same factors exist for it. The Upper Tieton was rated as the 3rd priority because the potential to improve wildlife habitat was not as great as the first two. The Tieton and Rattlesnake were rated as moderate because the watersheds are in a little better condition and there are fewer opportunities for improvement. Bumping/American and Oak Creek received low priority ratings because of the need for and opportunities to make improvements.

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Appendices

Appendix A – Human Use
Appendix B – Aquatic
Appendix C – Wildlife
Appendix D – Management Actions
Appendix E – Public Input Summary
Appendix F – Definitions

Appendix A: Human Use Rating Criteria

The objective of the human use portion of the roads analysis is to identify the level of importance road systems have to human use activities in a particular sub-basin or watershed. It also identifies primary activities or combination of activities road systems are used for. Social values vary greatly among users. Users with similar interests have different perceptions of what constitutes appropriate access. It is not possible to satisfy every individual or group of individuals, nor is it possible to identify what people will desire tomorrow or into the next decade. It is however possible to observe trends and at least make some qualitative estimates of what future needs may be. Generally we lack sufficient data to make accurate quantitative predictions. This exercise will attempt to show the major categories of human use that exist today on a broad scale without attempting to make quantitative predictions of future needs.

Due to an overlap in social needs, it is important to keep in mind the scale of population of users being considered; is it small scale/local community, medium scale/multiple community, large scale/regional, or very large scale/national importance? This consideration will help the decision maker determine whether management of a particular road segment will have a direct or indirect effect on the user.

Human use factors are grouped into broad categories relating to the amount of flexibility the decision maker has, whether the value is expected to be of a local, regional or national scale, the current use pattern, and desired future condition.

In the "questions addressed" section an alphanumeric code corresponds to the appropriate section in the "Roads Analysis Guide" FS 643, appendix. This code is linked to an ecological consideration, which has been formulated as a question. Each risk factor evaluated addresses one or more of these questions. The appendix should be consulted for more information on the risk factor, including a list of potential indicators (tools) that may be considered to appropriately rate each factor.

Criterion 1. Required by Law, Agreements, and Permits

Criterion 1 includes access needs necessary to meet legal requirements such as the Alaska National Interest Conservation Act (ANILCA), treaty requirements, easements, Memorandums of Agreement (MOA's), or various kinds of permits. Revised Statute 2477 (RS 2477) roads are included in this group. This factor provides the sideboards the forest manager has to work with and must consider the legal requirements and any agreements or commitments to other parties. Occasionally there are conflicting legal requirements. Agreements can usually be modified, but often times they are long-term and can cause significant impacts.

Questions Addressed

Legal basis (GT-1, 2, and 3)
Special Use Permits (SU-1)

Water Production (WP-1)

Rating

1. Identify areas where allocations involve Public Laws such as ANILCA, RS 2477 or where treaty requirements apply.
2. Identify areas that have active permits, easements or binding agreements.
3. Identify areas that have special use permits.
4. Relative ranking is based on the information:
   a. High (10) public law requires road access be provided.
   b. Medium (7) agreements or permits exist, but there are alternatives or options available to meet identified needs.
   c. Low (3) there are short-term commitments, which will expire or can be replaced with suitable alternatives.

Data sources

Special Uses Data System (SUDS)
Forest Land Use Report (FLUR)
INFRA

Criterion 2. Resource Management

Criterion 2 addresses the importance of road systems for administration, management, or protection of forest resources. Forest managers have the flexibility to analyze options and select one that provides the best balance of resource, social and economic needs. At the sub-basin scale, definitions or classifications would be identified by broad groupings such as the percent of a watershed, the percent of a dry site, or a FMAZ zone.

Questions Addressed

Value of road for implementation of desired future condition strategies, such as the "Dry Site Strategy"
Administrative Use needs (AU-1)
Value of road for Forest Service and cooperator to suppress wild land fires. Fire risk can be based on a combination of fire intensity mapping and knowledge of past fire occurrence. Fire intensity mapping is based on current vegetation, slope, aspect, elevation, and landform. This factor is considered highly important and is given a heavy numerical weighting. (PT-2)
Value of road for management of insect, disease, or noxious weed infestations.
Does road system address public health and safety (GT-4)
Does the Forest have the necessary easements and rights on the road?

Ratings

1. Identify project areas and land allocations where access is necessary to protect forest resources, facilities or property.
2. Identify locations of management strategies needing road access.

3. Identify levels of access necessary to meet these strategies.
4. Review the research, monitoring, or inventory requirements of land management plans.

5. Ranking is based on the above information:
   d. High (10) life or properties are at risk or the history of severe resource damage occurring in this area.
   e. Medium (7) access is necessary for resource protection for long term.
   f. Low (3) access is needed for implementation of management strategies for the near future.

Data sources

Analysis Files for Timber Sales and other projects
Past Harvest Layer - 5-year action plan
Fire Ignition Layer in GIS
Urban Interface mapping in GIS – natural vs. human caused fires
Infestation maps for insect and disease surveys
Past activity layer for weeds in GIS
Archeological probability maps (H/M/L)
Public Scoping

Criterion 3. Public Access and Level Use

Criterion 3 includes elements related to active and passive use by the public. Elements covered by this category include all outdoors recreation and travel of a general nature where users are physically present on the Forest. Also included are passive value elements which are elements that don't necessarily involve active participation but just knowing these elements are in place or available has significant value. The forest manager will need to involve large numbers and diverse groups in any decisions associated with this factor.

The most common need is generally thought to be for some form of recreation or leisure activity. There would also be instances where Forest managed road systems would be used by persons not directly involved with administrative activities, or have contractual/legal needs covered by other factors and needing or desiring access on the Forest road system. Seasonal patterns of use may be significantly different in some locations. This factor would include the broad spectrum of general public road access. Since this factor by definition involves actual access and use of the road, it is most important on a local and regional scale. There would be a lesser degree of importance on a national scale for stakeholders who come from other regions or states and use the Forest.

The Recreation Opportunity Spectrum (ROS) classification is used in the Forest Plan to arrange possible experience opportunities across a spectrum. ROS land delineations identify a variety of recreation experiences in six classes along a continuum from primitive to modern-urban. Each class is defined in terms of the degree to which it satisfies certain recreation needs based on area size, the extent to which the natural environment has been modified, the type of facilities developed, and degree of outdoor skills needed to enjoy the area. The seven ROS classes are: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, roaded

modified, rural and urban.

Questions Addressed

Unique physical or biological characteristics (PV-1)
Unique cultural or spiritual value (PV-2)
People's perceived needs and values for the road (SI-1)
Value to local community social and economic health (SI-6)
Effect on people's sense of place (SI-10)
Unroaded recreation values (UR-1 through 5)
Roaded recreation values (RR-1 through 5)
Access to developed sites
Access to undeveloped sites
Consistency with Recreation Opportunity Spectrum (ROS) classifications in the Forest Plan.

Ratings

1. Categorize emphasis or major use areas such as ORV, horse use areas, motorized winter sports, non-motorized winter sports, hiker only, and other established use patterns popular for recreation uses.
2. Identify the predominant ROS classification for sub basin.
3. Identify roads or segments stakeholders have an expressed interest in for certain types of use.
4. Relative rankings are based on above elements:
   a. High (10) road is needed to access developed facilities activities toward the developed end of the ROS scale.
   b. Medium (6) activities are semi-primitive motorized or semi-primitive non- motorized portion of scale. Low standard roads are preferred and/or low density is preferred to enhance the recreation activity.
   c. Low (3) semi-primitive non-motorized or primitive ROS classification. Activities are characterized being more challenging and more secluded. The degree of skill needed is greater.

Data sources

Scoping for specific projects
Frontliner contacts
Comment boxes and comment cards
Personal contacts
Travel cost survey

Criterion 4. Economics

Economics includes the relationship of the road system to local and regional economic values. Individuals and businesses that derive direct or indirect economic benefit from the Forest

constitute the stakeholders in this group. Though there are direct economic benefits from commodity production in fields such as mining, agriculture, and wood products manufacturing, economic benefits are also derived by providing services through contracts or permits. Permitted uses would include mushroom gathering, posts, poles, floral greenery, boughs, Christmas trees, and other miscellaneous forest products. The major economic benefits are indirect value to local and regional communities from people who come to the forest for business or pleasure, but trade in the businesses in association with their activities on the forest. Economic values are market based involving supply and demand.

The Interior Columbia Basin Ecosystem Management Project scientists concluded, "…that recreation use generates far more jobs than other uses of Forest Service and BLM administered lands. Recreation provided by these public lands contributed about 15 percent of total jobs, area-wide" (USDA FS 1996). The geographic scale for this factor is primarily local and regional.

Questions Addressed

Recreation and tourism (EC-3)
Commodity production (TM-3), MM-1), (RM-1)

Ratings

a. Identify areas that are allocated for or have become established for developed sites, fee sites, concession, or commercial permit operations, and are necessary to directly support these services.
b. Identify sub-basins that are important for activities that provide revenue to local communities and businesses.
c. Relative rankings are based on above:
   a. High (10) access is essential for commodity production or area business.
   b. Medium (6) tourism or local businesses benefit indirectly; other access points or forms of access could replace this road and businesses would not be severely effected. Road access is desirable to draw users into the communities.
   c. Low (3) economic dependency on access is either low or short term

Data sources

Sales tax
Costs for law enforcement, ambulance and fire services
SCORP report

Appendix A Works Cited

U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management. 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin, and Portions of the Klamath and Great Basins. Pacific Northwest Research Station, Portland, OR. 197 p

Table A-1. Human use ratings, Naches Sub-Basin

Road seg #	FS rd #	Seg length	Access required by law/agree	Resource mgmt.	ROS class	Level of use	Econ	Human use total	Human use rating
1	1000000	13.5	10	10		10	10	40	H
2	1010000	3.8	0	10		3	7	20	M
3	1040000	5.7	0	7		3	7	17	L
4	1050000	5	0	7		6	7	20	M
5	1070000	4.4	10	7		10	10	37	H
6	1200000	17.4	10	10		10	10	40	H
7	1200530	4.4	0	7		10	3	20	M
8	1200570	2.8	0	10		10	10	30	H
9	1200711	3.9	7	10		10	10	37	H
10	1200740	1.8	10	7		10	10	37	H
11	1201000	7.6	0	10		10	10	30	H
12	1202000	3.4	0	10		10	10	30	H
13	1202000	6.7	0	7		3	7	17	L
14	1203000	2.5	0	10		10	10	30	H
15	1204000	10	0	7		10	10	27	M
16	1205000	3.1	0	7		10	10	27	M
17	1205000	3.5	0	3		6	10	19	L
18	1205742	0.2	0	3		10	10	23	M
19	1207000	4.9	0	7		10	3	20	M
20	1241000	4.3	0	7		10	10	27	M
21	1302000	12.5	10	10		6	10	36	H
22	1306000	3.8	10	10		10	10	40	H
23	1308000	2.8	0	10		10	3	23	M
24	1400000	12.8	10	10		10	10	40	H
25	1400000	1.6	10	10		10	10	40	H

Road seg #	FS rd #	Seg length	Access required by law/agree	Resource mgmt.	ROS class	Level of use	Econ	Human use total	Human use rating
26	1400235	1.7	10	10		10	10	40	H
27	1401000	7.8	10	10		10	10	40	H
28	1500000	25	10	10		10	10	40	H
28a	1500000®		10	10		10	10	40	H
29	1500190	2.7	0	7		10	7	24	M
30	1500199	2.1	0	7		10	7	24	M
31	1500312	2	0	10		10	10	30	H
32	1500315	0.2	0	10		10	10	30	H
33	1501000	10.3	10	10		10	10	40	H
34	1502000	7.2	0	10		10	10	30	H
35	1503000	7.8	0	10		10	10	30	H
36	1504000	2.8	0	10		6	10	26	M
37	1600000	12.4	10	10		10	10	40	H
38	1600000	6.1	10	7		10	10	37	H
39	1601000	9.2	0	10		10	10	30	H
40	1603000	3.9	0	10		6	10	26	M
41	1605000	9.5	0	10		6	10	26	M
42	1607000	3.5	0	10		3	10	23	M
43	1611000	8.3	0	10		10	10	30	H
44	1701000	8.6	10	10		10	10	40	H
45	1701000	7.8	10	7		10	10	37	H
46	1702000	3.7	10	10		10	10	40	H
47	1702000	8.3	10	10		10	10	40	H
48	1703000	10	10	10		10	10	40	H
49	1704000	2.8	10	10		10	7	37	H
50	1704311	1.2	0	10		10	7	27	M
51	1705000	4.8	3	10		10	10	33	H
52	1706000	0.4	0	10		10	10	30	H

Road seg #	FS rd #	Seg length	Access required by law/agree	Resource mgmt.	ROS class	Level of use	Econ	Human use total	Human use rating
53	1706000	8.8	0	10		10	10	30	H
54	1706200	0.8	0	10		10	7	27	M
55	1707000	6.4	0	10		6	10	26	M
56	1708000	10.6	10	10		10	10	40	H
57	1709000	8.6	7	10		10	10	37	H
58	1709300	2.2	7	7		10	7	31	H
59	1712000	4.7	0	10		6	10	26	M
60	1720000	5.2	10	10		10	10	40	H
61	1800000	10.9	10	10		10	3	33	H
62	1800000	7.1	0	3		10	3	16	L
63	1808000	3.6	3	7		10	3	23	M
64	1900000	14.5	10	10		10	10	40	H
65	1900000	2.9	10	3		10	10	33	H
66	1901000	5.9	0	10		10	10	30	H
67	1901000	4.4	0	7		6	3	16	L
68	1902000	14.3	10	10		10	10	40	H
69	1902865	0.5	0	3		3	3	9	L
70	1902866	0.2	10	3		10	3	26	M
71	1903000	2.2	0	7		10	10	27	M
72	1906000	4.8	0	7		10	10	27	M
73	1911000	6.7	10	7		6	10	33	H
74	1913000	1.6	10	7		10	3	30	H
75	1920000	10.1	10	10		10	10	40	H
69	1902865	0.5	0	3		3	3	9	L
70	1902866	0.2	10	3		10	3	26	M

Appendix B: Aquatic Rating Criteria

The objective of the Aquatic Assessment is to characterize how the transportation system may be influencing watershed processes and aquatic habitat at the sub-basin and site scale. The assessment at the sub-basin and watershed scale is basically the same, the primary difference being the scale of road segment to be analyzed. The basic units of assessment at the sub-basin scale are the watersheds within the sub-basin and road segments of arterial and collector roads within the watersheds. The sub-basin scale analysis will help prioritize watersheds for further analysis based upon aquatic resources and potential restoration needs, identify issues within watersheds, establish context for the watershed or project scale analysis and identify potential management of the arterials and collectors. Analysis of local roads at the watershed or project level is basically the same while the segment is different. Ratings for the sub-basin scale analysis include overall watershed condition ratings and segment specific ratings. Once the sub-basin scale assessment is completed it is anticipated that only information specific to the smaller segments will be needed as part of project analysis. The watershed condition ratings are based upon the watershed BAs with further information provided by completed watershed analysis and existing GIS layers. The watershed condition ratings establish a context for the road segment ratings. The segment ratings are based upon stream survey data, road logs, culvert surveys, and local knowledge.

Development of the Aquatic Impact, At-Risk Criteria

Aquatic criteria were developed to capture key processes associated with roads as they link to aquatic environments.

Criteria include:

1. Geologic Hazard
2. Road Related Sediment
3. Floodplain off-channel habitat riparian reserve function
4. Flow Effects
5. At risk fish populations and wetlands.
6. Wetlands and Wet Meadows

In the Questions Addressed section an alphanumeric code corresponds to the appropriate section in the appendix of “Roads Analysis Guide.” This code is linked to an ecological consideration, which has been formulated as a question. Each risk factor evaluated addresses one or more of these questions. The appendix should be consulted for more information on the risk factor, including a list of potential indicators (tools) that may be considered to appropriately rate each factor. The term “at-risk fish” in this document refers to fish listed as threatened or endangered under the Endangered Species Act.

Criterion 1. Geologic Hazard

This criterion was developed to incorporate the natural risk of mass wasting as an effect on roads or potential for roads to accelerate mass movement events. Three forms of mass movement were identified: debris slides (shallow rapid landslides); earth slumps (fairly deep land slides); and

deep-seated landslides. On the Wenatchee and Okanogan NF debris slides are often associated with coarse textured sediment, earth slump medium textured sediment, and deep seated fine and very fine sediment.

The interpretation of mass wasting was taken from the Landtype Associations of North Central Washington's preliminary report (USDA FS 2000). These interpretations were based upon observations of landslide features, Landtype Association site features, and literature references. The interpretations are based upon geomorphic mapping, bedrock weathering properties, geologic structural features, slope gradient, drainage characteristics and patterns, and regolith features.

Geologic Hazard was considered to be a highly important factor relating to aquatic conditions. The numerical weighting however was restricted, weighted heavily toward the high and very high hazards. Each road segment will receive a rating for Geologic Hazard.

Questions Addressed

Mass wasting (AQ –3)

Rating

Low risk = 0
Moderate risk = 2
High risk = 6
Very high risk = 9

Criterion 2. Road-Related Fine Sediment

Surface erosion occurs on wildland roads due to erosion of the road surface, cut and fill slopes, and accelerated mass failures. Surface erosion of the road is sensitive to road design, road maintenance and geologic hazard. Road surface, design and maintenance of drainage structures can influence the amount of road surface erosion. Insufficient drainage structures, culverts, including ditch-relief culverts can also be sources of sediment.

Roads crossing areas of high geologic hazard or with unstable fill slopes may contribute to accelerated mass wasting initiated by the failure of the fill slope. Culverts at stream crossings can be a sediment source if the culvert is under-sized and the hydraulic capacity is exceeded or the culvert inlet is plugged causing stream flow to overtop the road. Large amounts of sediment can also be generated if the plugged culvert results in failure of the crossing resulting in a debris flow, when the culvert is overrun resulting in the stream flowing down the road surface eroding the surface and fill. Ditch relief culverts that erode fill material directly into streams is another sediment source.

Questions Addressed

Generated Surface Erosion (AQ – 2)

Mass Wasting (AQ – 3)
Stream crossing influence local stream channels and water quality (AQ – 4)

Ratings

A. Fine Sediment -Watershed Condition

a. 1 = Watershed is rated as Functioning Appropriately for fine sediment; transportation system consistent with the Aquatic Conservation Strategy (ACS).
b. 3 = Watershed is rated as At Risk for fine sediment; road system is a contributor to fine sediment but is not believed to be a major contributor and road system is generally consistent with ACS.
c. 6 = Watershed is rated as At Risk for fine sediment; roads are believed to be a major source of fine sediment and road system is inconsistent with ACS.
d. 10 = Watershed is rated as Functioning At Unacceptable Risk for fine sediment; road system is believed to be a major contributor of fine sediment, and road system is inconsistent with the ACS.

B. Fine Sediment – Segment

1 = Road segments with a paved surface, crossings are bridged or sufficient to pass the 100 year flood and associated debris. Cut and fill slopes are vegetated and not eroding. Crossings are not impacting channel morphology downstream.
3 = Road segment is native surfaced, or graveled but no visible erosion, ditch relief culverts are not causing erosion of fill into streams, crossings are perpendicular to the stream and sufficient to pass the 100 year flood, or designed so that if they do fail only the prism at the crossing fails. Crossings are not impacting channel morphology downstream or causing downstream bank erosion. There is no evidence of accelerated mass wasting due to the road segment.
5 = road segments not meeting above criteria to some degree but potential impacts to at risk fish habitat appear to be minor due to amount of erosion, potential sediment delivery if a crossing failure or fill slope failure were to occur, changes to channel morphology due to a crossing is confined to the site or does not alter the channel type.
10 = Road segments with high potential impacts to at risk fish habitat. Road surface and/or fill slopes exhibit either erosion into streams, visible ditch erosion, or cut slope erosion into ditches. Sediment directly enters fish-bearing stream from ditch, fill slopes begin to fail, and evidence of accelerated mass wasting due to the sediment becomes prevalent. Crossings with high potential for failure where failure of the prism will result in a large amount of sediment into at risk fish habitat or the culvert is over-topped, and it is highly likely the stream will travel down the road and deliver sediment to at risk fish habitat, crossings are altering stream channel type downstream and/or causing downstream bank erosion.

Criterion 3. Flood Plain Function, Off-Channel Habitat and Riparian Reserves

This criterion addresses how the road segment has altered the function of a stream's floodplain

and/or off-channel habitat. Flood plains are important regulators of stream flow and water quality. They absorb over bank floodwaters, allowing water to soak through vegetation/organic mat, and into the ground. Here water can be stored and released more slowly into streams. In doing so, functioning floodplains can provide more water in late summer and reduce peak floods in winter and spring.

Roads can affect flood plains by
a.) Limiting the frequency of over bank flows and concentrates greater volumes of water within stream banks.
b.) Interfering with the ability of the stream to migrate across its flood plain.
c.) Preventing slope runoff from recharging flood plain aquifers.
d.) Intercepting runoff and floodwaters, and concentrating the eroding power of the water.
e.) Indirectly degrade flood plain function by encouraging off-road motorized access from roads onto flood plains.

Indicators of direct and indirect flood plain or riparian reserve degradation include

- Soil compaction
- Noxious weed introduction
- Evidence of soil erosion or mass wasting of road fill during peak runoff
- Water quality changes
- Artificial confinement of streams
- Stream bank erosion,
- Interruption of hill slope delivery of water onto floodplain
- Loss of downed or standing woody debris that is both an energy dissipater and a habitat component.

Similar impact occurs if roads are within or provide vehicle access to the portion of a riparian reserve that affects aquatic habitat. Effects include loss of bank vegetation with associated loss in cover and accelerated bank erosion, reduction in large wood from the channel or potential large wood due to wood cutting or hazard tree removal, soil compaction, and accelerated surface erosion. Off-road access, provided by roads onto flood plains or riparian reserves is influenced by factors which include: a.) Proximity of road to flood plain, b.) Slope of ground leading from road onto floodplain, and c.) Desirability of flood plain determined by its width and demands for dispersed use. With more alteration the likelihood increases that stream systems will not function properly and those road segments within the flood plain will be at higher risk of damage.

Off-channel habitats provide important rearing habitat and refuge habitat during high flows. Roads in flood plain may isolate these off-channel areas so they are no longer accessible to fish or completely fill them. A road system may not isolate or fill an off-channel area but by providing access to vehicles may result in loss of vegetation, bank stability, large wood input, cover, and a loss of overall habitat quality.

The watershed is first rated as a whole using the “watershed condition” set of scores below, then the individual road segments are rated using the “road segment” scores.

Questions Addressed

Changes in physical channel dynamics (AQ – 9)
Affects to shading, litterfall and riparian plant communities (AQ – 11)
Affects of fishing, poaching and direct habitat loss for at risk aquatic species (AQ – 12)

Rating

A. Flood Plain Function – Watershed Condition

a. 1 = main arterials and collectors are not located in valley bottoms or if located in valley bottom are not constricting the channels nor providing dispersed recreation access which is diminishing flood plain function or off-channel habitat quality. Flood plain connectivity, off-channel habitat and riparian reserves are rated as Functioning Appropriately.

b. 3 = some arterial and collector roads are located in the valley bottoms and are causing minor stream confinement. Dispersed recreation access is not resulting in adverse impacts to the flood plain, riparian function that affects aquatic habitat, or off channel habitat. Flood plain connectivity, off channel habitat and riparian reserves are rated as Functioning Appropriately. If riparian reserves are rated as Functioning At Risk the rating is not primarily due to the road system or dispersed recreation. While riparian reserves may be at risk, off channel habitat and flood plains are functioning appropriately.

c. 9 = main arterial and/or collectors are constricting streams so that floodplain connectivity and/or off channel habitat are rated At Risk and/or Riparian Conservation Areas are rated as At Risk due to dispersed recreation, or if there is concern over potential dispersed use, even if Riparian Conservation Areas are currently Functioning Appropriately. Dispersed use is not consistent with ACS or appears to be moving towards being inconsistent with ACS.

d. 10 = Flood plain connectivity or off-channel habitat and/or Riparian Conservation Areas are considered to be Functioning At Unacceptable Risk due to road system and or dispersed recreation. Generally dispersed recreation would currently be inconsistent with ACS.

B. Flood Plain Function – Road Segment

a. 1 = road segment is not located in valley bottom or is located on toe slope in confined valley bottom outside the 100 year floodplain and not interfering with floodplain function.

b. 6 = road segment located on moderately confined valley or unconfined bottoms with localized areas of road encroachment on stream channel. Road location may be providing motorized off-road access onto flood plain or within riparian reserve such that flood plain or riparian habitat conditions which affect aquatic habitat are showing signs of degrading in localized areas (see indicators above).

c. 9 = road segment located on unconfined valley bottom which frequently or continuously restricts channel migration, off-channel habitat and riparian habitat

conditions affecting vegetation, altering movement of water, accelerating erosion processes, interfering with recruitment of large woody debris (LWD), and/or is providing access for motorized off-road dispersed use within the flood plain or riparian reserve to the point riparian habitat conditions affecting riparian habitat are being degraded.

Criterion 4. Flow effects

Criterion 4 addresses if road segment
a.) intercepts surface runoff and near surface ground water, along cut slopes and ditch lines, converting subsurface flows to surface flows, and
b.)increases delivery efficiency of these flows by diverting them directly to streams.

Where these combined flows are continuous between roads and stream systems there is hydrologic connectivity. Hydrologic connectively is defined as any road segment that during runoff has a continuous surface flow between any part of the road prism and a natural stream channel. Water moves from hill slopes to valley bottom via surface and subsurface paths. Roads affect flow when they cut across hill slopes and/or require fill material through depressions that interrupt these natural paths. Road cut slopes or ditches intercept surface runoff and groundwater, accelerating their movement toward stream crossings. This action frequently increases soil erosion risks and routing efficiencies, which deliver road derived sediments and contaminants to streams and can alter peak flows and channel characteristics downstream. Precipitation runoff mechanisms including rain-on-snow, spring snowmelt and convectional storms should be considered when evaluating a road segment's hydrologic connectivity. Indicators of these effects include water interception on road surfaces and ditch lines, absences of ditch line relief culverts or cross drains, or interruption and detention of flows by road fill. Both road location and actual road densities within the watershed are used in this criterion.

Questions Addressed

Affects to surface and subsurface hydrology (AQ – 1)
Affects to water quality, quantity and hydrologic connectivity (AQ **– 6)**

A. Flow affects – Watershed Condition

a. 1 = Roads are not greatly impacting watershed function. Road Density and Location, changes in peak/base flows are Functioning Appropriately.
b. 3 = Road Density and Location are Functioning At Risk but Change in Peak/Base Flows is Functioning Appropriately
c. 6 = Road Density and Location are Functioning At Risk or Unacceptable Risk and Change in Peak/Base Flows is Functioning At Risk
d. 9 = Road Density and Location is Functioning At Risk or Unacceptable Risk and Change in Peak/Base flows is Functioning At Unacceptable Risk

B. Flow Effects–Segment

a. 0 = Road segment is not intercepting concentrating runoff or groundwater in ditch lines. Runoff is cross-drained through a vegetative filter prior to reaching stream

channels. Natural flow paths are maintained uninterrupted.

b. 3 = Road segment is occasionally intercepting runoff, especially during peak events, but generally not groundwater. Delivery efficiencies are low due to combination of landform slope and weakly developed stream networks. Some additional ditch relief is necessary for routing surface runoff through vegetative filter. Downstream stream reaches may be susceptible to damage from increase peak flows.
c. 9 = Road segment frequently intercepting both surface runoff and/or groundwater in sufficient volumes to influence flow downstream and delivering waters directly to streams. Landform slopes are steep and drainage densities high, providing increased delivery efficiency to stream channels. Downstream channels are unstable and susceptible to damage from increased peak flows. Road prisms may be interrupting and detaining water preventing it from recharging floodplain aquifers. Road has high hydrologic connectivity to the stream system.

Criterion 5. At-Risk Fish Populations

This criterion addresses the relative importance of a sub-watershed to the conservation and recovery of at risk fish and to help weigh the potential for adverse impacts to at risk fish or their habitat. Besides the potential impacts to aquatic habitat, roads can increase the potential for poaching or introduction of exotic species.

Questions Addressed

Downstream beneficial uses of water and demands (AQ – 7)
Affects to migration and movement of aquatic organisms (AQ – 10)
Affects to fishing, poaching and direct habitat loss for at risk aquatic species (AQ – 12)
Affects to areas of exceptionally high aquatic diversity or rare or unique species (AQ – 14)

A. At-Risk Fish Populations

This criterion addresses whether fish listed for protection under the Endangered Species Act are present in the watershed and the relative importance to recovery within the sub-basin.

a. 0 = No at risk fish present in the sub-basin or watershed
b. 1 = At risk fish are present but there are no significant sub-watersheds.
c. 3 = At risk fish are present but there are no significant sub-watersheds because populations are depressed preventing identification of significant sub-watersheds or significant sub-watersheds have been identified but populations are very low and habitat is fragmented or severely degraded.
d. 6 = At-risk populations are present with significant sub-watersheds for one or multiple species; habitat connectivity exists within the watershed. Habitat conditions are such that with relatively low investment in restoration the watershed could be a refugia from a habitat standpoint or management emphasis on restoration for other resources can be coordinated with aquatic/watershed restoration (i.e. “dry site or 303d.)
e. 9 = Multiple significant sub-watersheds exist for multiple species or watershed represents a refugia within the sub-basin for one or more species

B. At-Risk Fish Populations–Road Segment (AQ-7, 10, 12, 14)

a. 1 = Road segment with the following set of conditions: road segments located in 6th field watershed with no listed fish species; stream crossings are not migration barriers (any life stage) for other fish species.
b. 3 = Road segment is in a sub-watershed with at risk fish or tributary to a watershed with at risk fish, but neither the sub-watershed is within nor the sub-watershed downstream is a significant sub-watershed for an At Risk species. Stream crossings are not barriers to at risk fish, but may be to other species.
c. 5 = Road segment is in a sub-watershed with at risk fish or tributary to a watershed with at risk fish, but neither the sub-watershed is within nor the sub-watershed downstream is a significant sub-watershed for an At Risk species, but one or more crossings are present that present a barrier to at risk fish at some life stage.
d. 6 = Road segment is in a significant sub-watershed for an at risk species or is a tributary to significant sub-watershed, no road crossings are barriers to any life stage of an at risk species, poaching is not a major concern.
e. 8 = Road segment is in a significant sub-watershed for an at risk species or is tributary to a significant sub-watershed, no road crossings are barriers to any life stage of an at risk species, but poaching due to access from the road segment is a concern though not necessarily documented.
f. 10 = Road segment is in a significant sub-watershed for an at risk species or is tributary to a significant sub-watershed. The road segment is or has potential, based upon the previous factors, to have serious adverse impacts to at risk fish habitat; and/or there are road crossing barriers to some life stage of at risk species and/or there is known poaching of at-risk fish occurring.

Criterion 6. Wetlands and Wet Meadows

This criterion addresses whether wetlands are present along road systems, if road segments interfere with their condition and function, ground water movement or wetland vegetation.

A road segment's influence on the condition and function of adjacent wetlands is a result of either a direct impact such as

a road location relative to the wetland.
indirect impacts related to the road effect on the wetland supporting hydrology.
vegetative community and soil characteristics.

The most notable effects include

converting productive wetlands to compacted road surfaces .
providing motorized off-road access into these areas.
constraining and diverting both surface and subsurface flows that support the water table.
intercepting runoff which can accelerate erosion and lower water tables.
increased sediment loading and delivery of toxic pollutants.
conversions in plant species composition by introducing noxious weeds.
reduced base flows and increase peak flow and flood frequencies and degrade water quality.

Of these effects, those that affect the areas ability to receive, store and move water will likely

have the greatest impact on the wetland's condition and function.

Questions Addressed

Affects of wetlands

Ratings

Listed below is a summary of hazard rating for road segments:

a. 0 = Road segment is either not near or adjacent to wetlands/wet meadows, or road design characteristics are providing for the uninterrupted movement of surface and groundwater necessary to support the wetland's vegetation and soil characteristics.
b. 3 = Road segment is adjacent to or crosses small localized wetlands or wet meadows. Road design characteristics, particularly crossings of surface and near surface water paths are limiting the available water necessary to inundate and saturate the landform and support the wetland's vegetation and soil characteristics. Initiation of wetland degradation including noxious weed establishment, increased sediment loading, and decreased area of saturation is occurring.
c. 6 = Road segment is adjacent to or crosses landscape scale wetland's or wet meadows. The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland, increasing sediment and contaminant loadings. Crossings of surface and near surface water paths have severely limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Road segment may be providing motorized off-road vehicles access into the area, further contributing to its degradation

Appendix B Words Cited

U.S. Department of Agriculture, Forest Service. 2000. Landtype Associations of North Central Washington, Wenatchee, Okanogan and Colville National Forests. Preliminary Report, Unpublished document. On file with Okanogan and Wenatchee National Forests Headquarters Office, 215 Melody Lane, Wenatchee, WA. 98801. 98 p.

Table B-1. Aquatic impact, at-risk, Naches Sub-Basin

Road seg. #	FS rd. #	Seg. length	Geol. hazard	Rd.-related fine sedim.	Flood plain funct.	Flow effects	At-risk fish pops	Wetlands & meadows	Aquatic total	Aquatic rating
1	1000000	13.5	2	5	1	3	10	0	21	M
2	1010000	3.8	2	5	1	3	10	0	21	M
3	1040000	5.7	9	10	1	9	8	0	37	H
4	1050000	5	9	10	6	9	10	0	44	H
5	1070000	4.4	0	3	1	3	6	0	13	L
6	1200000	17.4	6	3	1	3	3	3	19	L
7	1200530	4.4	6	3	1	3	3	0	16	L
8	1200570	2.8	9	3	1	3	3	3	22	M
9	1200711	3.9	6	3	6	0	6	6	27	M
10	1200740	1.8	6	3	1	3	6	0	19	L
11	1201000	7.6	6	3	1	3	5	0	18	L
12	1202000	3.4	9	5	1	9	6	3	33	H
13	1202000	6.7	9	5	6	3	6	3	32	H
14	1203000	2.5	6	3	1	3	10	3	26	M
15	1204000	10	0	3	1	3	6	0	13	L
16	1205000	3.1	6	5	1	3	6	0	21	M
17	1205000	3.5	0	3	1	3	6	0	13	L
18	1205742	0.2	0	3	1	0	6	0	10	L
19	1207000	4.9	2	5	6	3	5	0	21	M
20	1241000	4.3	0	3	1	0	6	0	10	L
21	1302000	12.5	0	5	1	3	3	0	12	L
22	1306000	3.8	6	10	6	3	5	0	30	H
23	1308000	2.8	2	5	6	3	10	6	32	H

Road seg. #	FS rd. #	Seg. length	Geol. hazard	Rd.-related fine sedim.	Flood plain funct.	Flow effects	At-risk fish pops	Wetlands & meadows	Aquatic total	Aquatic rating
24	1400000	12.8	2	3	1	3	3	0	12	L
25	1400000	1.6	6	3	1	3	3	0	16	L
26	1400235	1.7	0	3	1	3	3	3	13	L
27	1401000	7.8	0	5	9	9	3	3	29	H
28	1500000	25	2	3	1	3	3	0	12	L
28a	1500000®		2	3	6	3	6	0	20	M
29	1500190	2.7	0	3	1	3	6	0	13	L
30	1500199	2.1	0	3	1	0	6	3	13	L
31	1500312	2	3	5	1	0	3	0	12	L
32	1500315	0.2	2	3	1	0	3	3	12	L
33	1501000	10.3	2	3	9	9	5	6	34	H
34	1502000	7.2	2	3	1	3	6	3	18	L
35	1503000	7.8	6	3	1	3	6	0	19	L
36	1504000	2.8	2	3	1	3	6	0	15	L
37	1600000	12.4	2	3	6	3	6	0	20	M
38	1600000	6.1	2	3	1	0	6	0	12	L
39	1601000	9.2	2	3	6	3	6	0	20	H
40	1603000	3.9	2	3	1	3	6	3	18	L
41	1605000	9.5	0	3	1	3	6	0	13	L
42	1607000	3.5	2	3	1	3	6	0	15	L
43	1611000	8.3	2	10	9	9	5	0	35	H
44	1701000	8.6	6	3	1	3	6	0	19	L
45	1701000	7.8	2	3	1	3	6	0	15	L
46	1702000	3.7	6	5	9	9	10	0	39	H
47	1702000	8.3	2	3	1	3	6	0	15	L
48	1703000	10	2	3	6	3	10	0	24	M

Road seg. #	FS rd. #	Seg. length	Geol. hazard	Rd.-related fine sedim.	Flood plain funct.	Flow effects	At-risk fish pops	Wetlands & meadows	Aquatic total	Aquatic rating
49	1704000	2.8	0	10	6	3	6	0	25	M
50	1704311	1.2	0	10	6	3	10	0	29	H
51	1705000	4.8	2	3	1	3	6	0	15	L
52	1706000	0.4	2	1	1	3	6	0	13	L
53	1706000	8.8	2	3	1	3	10	0	19	L
54	1706200	0.8	2	1	6	3	10	3	25	M
55	1707000	6.4	2	3	1	3	6	6	21	M
56	1708000	10.6	9	10	6	3	10	6	44	H
57	1709000	8.6	2	3	1	3	6	0	15	L
58	1709300	2.2	2	10	6	3	6	6	33	H
59	1712000	4.7	0	3	1	0	6	0	10	L
60	1720000	5.2	2	3	1	3	6	0	15	L
61	1800000	10.9	6	5	6	3	10	3	33	H
62	1800000	7.1	2	3	1	3	10	0	19	L
63	1808000	3.6	6	3	6	3	10	3	31	H
64	1900000	14.5	2	1	9	3	10	6	31	H
65	1900000	2.9	2	3	1	3	6	3	18	L
66	1901000	5.9	2	5	1	3	6	0	17	L
67	1901000	4.4	2	5	1	3	6	0	17	L
68	1902000	14.3	2	3	1	3	6	0	15	L
69	1902865	0.5	2	3	1	3	6	0	15	L
70	1902866	0.2	2	3	1	3	6	0	15	L
71	1903000	2.2	0	3	1	3	6	6	19	L
72	1906000	4.8	2	3	6	3	6	3	23	M
73	1911000	6.7	2	5	6	3	10	0	26	M
74	1913000	1.6	2	3	1	3	6	3	18	L

Road seg. #	FS rd. #	Seg. length	Geol. hazard	Rd.-related fine sedim.	Flood plain funct.	Flow effects	At-risk fish pops	Wetlands & meadows	Aquatic total	Aquatic rating
75	1920000	10.1	2	5	1	3	6	0	17	L

Table B-2. Naches Ranger District roads analysis, 01/08-09/01, Hoefer, Garrigues, Davis, McDonald, Robison

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
Upper Tieton 5th Code	2	6	9	6	9		32	
1000 South Fork Tieton	2	5	1	13	310		21	#2 Fill failures, Camp Creek to discovery Creek and Bear Creek areas
1010, Short & Dirty	2	5	1	3	10		21	#2 Bare cut and fill slopes to South Fork near bridge
1040 Bear Creek	9	10	1	9	8		37	#2 Cut and fill failures at Corral crossing
1050	9	10	6	9	10		44	Failure into South Fork
1070		3	1	3	6		13	
1200 Teiton Road	6	3	1	3	3	3	19	#2 Undersized culverts in Bear and Mill Creeks; #5 steelhead in Lower Mill Creek
1200530 Round Mtn., 830	6	3	1	3	3		16	#5 Bull trout in North Fork
1200570 Chimney Peaks	9	3	1	3	3	3	22	#5 Steelhead in Mill Creek; #3 extensive wet areas adjacent to road of historic site
1200711 Peninsula Road	6	3	6		6	6	27	#3 Road provides dispersed access to wetland area first ¼ mile; #5 Bull trout in

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
								lake; #6 provides access to localized wetlands
1200740 Clear Lake CG across spillway	6	3	1	3	6		19	#5 Bull trout in lake which has no barriers
1201	6	3	1	3	5		18	#5 Barrier on Jumpoff Creek
1202 Sleepy Park Road	9	5	1	9	6	3	33	#2 Landslide terrain with higher potential for sediment delivery; #4 same; #5 Bull trout in Rimrock
1202 6.7 mile segment	9	5	6	3	6	3	32	Steeper topography with multiple stream crossings; #3 location adjacent to stream providing dispersed access; #5 Bull trout in Rimrock
1203 Fish Creek	6	3	1	3	10	3	26	#3 Intercepting some groundwater from side slope; #5 barrier to juvenile bull trout
1204 Pinegrass to Section 3 Lake.		3	1	3	6		13	#5 Bull trout in Rimrock with no barriers
1205 3.1 miles	6	5	1	3	6		21	#2 Long grade without adequate ditch relief and

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
								large cuts at channel crossings; no barriers to bull trout in Rimrock; not a significant bull trout watershed
1205 3.5 miles		3	1	3	6		13	#5 Bull trout in Rimrock with no barriers
1205742		3	1		6		10	#5 Bull trout in Rimrock with no barriers
1207 North Fork Tieton	2	5	6	3	5		21	#2 crossings are impacting channel morphology by accelerating velocity, need bridge or large arch; #3 provides dispersed access via old timber sale haul road
1241		3	1		6		10	#3/4/6 Ridge top road; #5 significant rating for bull trout
Lower Tieton 5th Code		6	10	6	1		23	
1302 Jumpoff		5	1	3	3		12	#2 Dry rocky ridge top road with shallow soils and some erosion
1306 Wildcat	6	10	6	3	5		30	#2/3 Thunder Crossing undersized, has blown out and altered stream, is delivering sediment to

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
								creek; watershed has bull trout/steelhead, but is not significant
1308 Indian Creek	2	5	6	3	10	3	29	#2 Intercepts tallus spring and drains along road, road should be closed just before spring; #5Known poaching in a significant system, closure would solve problem
1400 12.8 mile Oak Creek	2	3	1	3	3		12	#5 Bull trout/steelhead present but not a significant watershed and road has arches at crossing
1400 1.6 mile	6	3	1	3	3		16	#5 Bull trout/steelhead present but not a significant watershed and road has arches at crossing
1400235 Bear Lake Road		3	1	3	3		13	#6 Proximity to Lynne Lake provides dispersed access
1401 South Fork Oak Creek		5	9	9	3	3	29	#2 Close proximity to stream, is sediment source and confines channel; #5 not a significant watershed
1500 Bethell Ridge Road, Tieton side	2	3	1	3	3		12	#3 Lowest section, ½ mile adjacent to Rattlesnake; #5 significant rating for

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
								steelhead in Rattlesnake
1500 Rattlesnake side	2	3	6	3	6		20	#3 Lowest section, ½ mile adjacent to Rattlesnake; #5 significant rating for steelhead in Rattlesnake
1500190 Timberwolf		3	1	3	6		13	#4 Weakly developed stream network; #5 no stream crossings
1500199 Cash Prairie		3	1		6	3	13	#1 Ridge top; #6 through meadow with observed rutting
1500312 Tieton Pond	3	5	1		3		12	#1 Natural barriers to sediment movement; #2 minor erosion
1500315 Tieton Pond	2	3	1		3	3	12	
Rattlesnake 5th Code		3	3	3	9		18	
1501 Little Rattlesnake	2	3	9	9	5	6	34	#2 hald paved; #5 Horse Creek, etc. is barrier to CT; #6 providing motorized access to meadows
1502 McDaniel Lake	2	3	1	3	6	3	18	#5 Not near fish
1503 Devil's Canyon	6	3	1	3	6		19	#1 No site specific problems
1504 Old 1500	2	3	1	3	6		15	#1 End at Three Creeks is

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
lower end to Three Creeks								high, rest is moderate
Main stem Naches 5th Code		6	9	6	6		27	
1600 Nile Road lower 12.4 miles	2	3	6	3	6		20	#2 Delivery along North Fork Nile; #3/9 along North Fork Nile; #4 along North Fork Nile; #5 No barriers
1600 Nile Road upper 6.1 miles to Clover Spring	2	3	1		6		12	
1601 Dry Creek	2	3	6	3	6		20	#3 Nile crossing providing access
1603	2	3	1	3	6	3	18	#6 Allowing access to pond in Section 13
1605		3	1	3	6		13	#2 Cut slope at Nile ford is problem; #3 ford with fish present; #6 some sediment delivery
1607	2	3	1	3	6		15	
1611 Orr Creek	2	10	9	9	5		35	#2 Crossing failure diverts onto road; #3 lower 2 miles confining channel; #4 delivering water directly into channel; #5 lower crossing blocking passage

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
								due to debris position
1701 Benton Creek lower 8.6 miles	6	3	1	3	6		19	
1701 Benton Creek upper 7.8 miles	2	3	1	3	6		15	
1702 Rock Creek lower 3.7 miles	6	5	9	9	10		39	#22 Close proximity to stream; #3 lst mile confining
1702 Rock Creek upper 8.3 miles	2	3	1	3	6		15	
1703 Gold Creek	2	3	6		10		21	#5 Culvert barrier if highway barrier is fixed; #1 first 1.5 miles is high
1704 Old River Road		10	6	3	6		25	#2 buffer between road and river behind Whistlin' Jacks
1704311 Lost Creek Village		10	6	3	6		25	#2 Proximity to river
1705 Spring Creek	2	3	1	3	6		15	
1706 Swamp Creek 0.4 paved portion	2	1	1	3	6		13	
1706 Swamp	2	3	1	3	10		19	#5 Barrier on Swamp Creek

	Aquatic assessment							Supporting documentation
	Geolog hazards 1	Fine sedim 2	Floodplain funct 3	Flow effect 4	At-risk fish pop 5	Wetlands/ Meadow 6	Aquatic total	
Creek upper 8.8 miles								
1706200 Boulder Cave road	2	1	6	3	10	3	25	#5 Barrier on Swamp Creek
1707 Pine Creek	2	3	1	3	6	6	21	#6 Providing access to wet meadows
1708 Milk Creek	9	10	6	3	10	6	44	#1 1.5 miles of highly unstable in upper portion; #3 confining lower 1 mile; #6 4x4 access to meadows
1709 Devil Creek	2	3	1	3	6		15	
1709300 Halfway Flat	2	10	6	3	6	6	33	#2 No buffer between road and river, provides access to riparian areas
1712 Clemans		3	1		6		10	
1720 RH Rock Creek	2	3	1	3	6		15	

Appendix C: Wildlife Rating Criteria

The objective of this portion of the roads analysis is to characterize the wildlife/road interactions that occur within each watershed within a sub-basin. The sub-basin analysis will identify Level 3-5 roads for management, prioritize watersheds for further analysis at the watershed scale based upon potential restoration needs for wildlife habitats, identify issues within watersheds, and establish the context for watershed scale roads analysis.

The analyses described below can be used to address wide-ranging carnivores, late-successional associated species, riparian-dependent species, ungulates, and unique habitats. Table C-1 provides an approach to rank watersheds based upon the wildlife issues within each watershed and the potential to provide benefits to the restoration of wildlife habitats. Table C-2 provides a summary of road-associated factors that affect wildlife habitats or populations (Wisdom et al. 1999). The analyses address the terrestrial wildlife (TW) roads analysis questions, TW (1), TW (2), TW (3), TW (4), and ecosystem functions (EF) question EF (2) identified in "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System" (USDA Forest Service 1999). The analyses described in this document are an adaptation of the TW questions to better address the issues and conditions on the Okanogan and Wenatchee National Forests.

In the Questions Addressed section an alphanumeric code corresponds to the appropriate section in the "Roads Analysis Guide" FS 643, appendix. This code is linked to an ecological consideration, which has been formulated as a question. Each risk factor evaluated addresses one or more of these questions. The appendix should be consulted for more information on the risk factor, including a list of potential indicators (tools) that may be considered to appropriately rate each factor.

Definitions

Impassable road – Roads that are not reasonably or prudently passable by conventional four wheeled passenger vehicles, motorcycles or all terrain vehicles.

Restricted road – Roads that are legally restricted, typically with gates or berms and information is available showing that use does not exceed 14 days.

Open road – Roads open to motorized use during any portion of the season of concern for the particular species being addressed. If information is not available concerning the effectiveness of a gate or berm it may be best to assume it is open.

Table C-1. Relative ranking scheme to determine the priority of watersheds for watershed scale analysis within each sub-basin for each species group or habitat

Species group/Habitat	High	Moderate	Low
Wide-Ranging Carnivores	9	5	1

Species group/Habitat	High	Moderate	Low
Late-Successional Species	10	6	2
Riparian Dependent	10	6	2
Ungulates	9	5	1
Unique Habitats	10	6	2

Table C-2. Road-associated factors that negatively affect habitat or populations of wildlife species (based on Wisdom et al. 1999) and the wildlife species group for which effects of the road-associated factor has been documented

Road-associated factor	Effect of factor	Wildlife group affected
Hunting	Non-sustainable or non-desired legal harvest by hunting facilitated by road access.	Wide-ranging carnivores; Ungulates
Poaching	Increased illegal take of animals, as facilitated by roads.	Wide-ranging carnivores; Ungulates
Collisions	Death or injury resulting from a motorized vehicle running over or hitting an animal	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique Habitats
Chronic negative human interactions	Increased mortality of animals (e.g. euthanasia or shooting) due to increased contact with humans, as facilitated by road access.	Wide-ranging carnivores
Movement barrier	Interference with dispersal or other movements as posed by a road itself or by human activities on or near a road or road network.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique Habitats
Displacement or avoidance	Spatial shifts in populations or individual animals away from a road or road network in relation to human activities on or near a road or road network.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique Habitats
Habitat loss and fragmentation	Loss and resulting fragmentation of habitat due to the establishment of roads, road networks, and associated human activities.	Wide-ranging carnivores; Late-successional; Riparian dependent; Ungulates; Unique Habitats;

Criterion 1. Wide-Ranging Carnivores

This group of species includes the grizzly bear (Threatened), gray wolf (Endangered), wolverine, and lynx (Threatened). Several studies have documented the effects of road-associated factors on carnivores and they have included hunting, poaching, collisions, chronic negative human interactions, movement barriers, displacement/avoidance, habitat loss and fragmentation (Thiel 1985, McLellan and Shackleton 1988, Mech et al. 1988, Kasworm and Manley 1989, Mace et al. 1996, Singleton and Lehmkuhl 1998). Several questions remained unanswered concerning the relationship between lynx and roads. McKelvey et al. (1999) found no evidence that narrow, forest roads at relatively low road densities affected habitat use by lynx. However, their analyses did not address potential indirect effects of roads on habitat quality for lynx. There is some additional speculation that roads used during the winter for snowmobile routes may increase the interactions between lynx and other competitors such as bobcat and coyotes (Buskirk et al. 1999). Therefore, to err on the conservative side, road associated factors and lynx are considered in this analysis.

Question Addressed

a.) Direct effects on terrestrial species habitat (TW – 1)
b.) Affects to habitat by facilitating human activities (TW – 2)
c.) Affect to legal and illegal human activities i.e. trapping, hunting, poaching (TW – 3)

Rating

1. Analysis Area: The watershed (5^{th} Field) within the sub-basin (4^{th} Field).
2. Follow the process described in the Interagency Grizzly Bear Committee Task Force Report (1998) to develop maps of core areas and road densities within each watershed in the sub-basin.
3. Identify issues and priorities for further watershed level roads analysis and for habitat restoration of Level 3-5 roads in each watershed within the sub-basin based on the following:
   a. Amount and location of core areas in the watershed.
   b. Road density within the watershed, defined as: high = >2mi/mi^2, moderate = 1-2mi/mi^2, and low = <1 mi/mi^2.
   c. Proportion of the watershed affected by winter use of road in a Lynx Analysis Unit.
4. Relative Ranking. Based on the above information rank the watershed and the Level 3-5 road as follows:
   a. Low (1) – low potential to improve conditions for the target species.
   b. Moderate (5) – moderate potential to improve conditions for the target species.
   c. High (9) – high potential to improve conditions for the target species.

Criterion 2. Late-Successional Associated Species

There are over 100 wildlife species that were identified on the Wenatchee National Forest which were associated with some type of late-successional forest type (USDA FS 1997). A review of the available literature on these species showed that approximately one-third could be affected

by roads or road-related activities (USDA FS 1997). Road-associated factors that could affect these species include collisions, movement barriers, displacement/avoidance, habitat loss and fragmentation (USDA FS 1997, Singleton and Lehmkuhl 1998, Wisdom et al. 1999).

Questions Addressed

a.) Direct effects on terrestrial species habitat (TW – 1)
b.) Affect to habitat by facilitating human activities (TW – 2)
c.) Affect to legal and illegal human activities i.e. trapping, hunting, poaching (TW – 3)

Rating

Analysis Area: The watersheds within the sub-basin.

a. Follow the process outlined in the Wenatchee National Forest Late-Successional Reserve Assessment (LSRA, page 107 of the forest wide). Refer to the LSRA to determine the current condition of security habitat within the LSR.

2. Identify the issues and priorities for further analysis, and Level 3-5 road restoration opportunities for each watershed within the sub-basin based on the following:
    a. Juxtaposition of late-successional habitat to road or road segment.
    b. Road density (high = >2mi/mi^2, moderate = 1-2mi/mi^2, and low = <1 mi/mi^2.) and security habitat conditions within the LSR.
    c. Potential of the road to enhance security habitat within the LSR.
3. Relative Ranking. Based on the above information rank the watershed and the Level 3-5 roads as follows:
    a. Low (2) – low potential to improve the security habitat and habitat effectiveness in the LSR.
    b. Moderate (6) – moderate potential to improve the security habitat and habitat effectiveness in the LSR.
    c. High (10) – high potential to improve the security habitat and habitat effectiveness in the LSR.
    d. If none of the watershed is within an LSR score as 0.

Criterion 3. Riparian-Dependent Species

This group of wildlife species includes about 285 vertebrate species that are either directly dependent on riparian habitat or use them more than other habitats (Thomas et al. 1979). Road-associated factors that could affect these species include collisions, movement barriers, displacement/avoidance, habitat loss and fragmentation (USDA FS 1997, Singleton and Lehmkuhl 1998, Maxwell and Hokit 1999, Wisdom et al. 1999).

This analysis addresses terrestrial wildlife roads analysis question TW (4) identified in Roads Analysis: Informing Decisions about Managing the National Forest Transportation System (USDA FS 1999).

Questions Addressed

Affects of unique communities or special features (AW – 4)

Rating

The Analysis Area: The watersheds within the sub-basin.

1. Determine the area within riparian reserves and density of roads within riparian reserves.
2. Identify the issues and priorities for further analysis, and Level 3-5 road restoration opportunities for each watershed within the sub-basin based on the following:
    a. Proportion and area of the watershed in riparian reserves.
    b. Road density within the riparian reserves (high = >2mi/mi^2, moderate = 1-2mi/mi^2, and low = <1 mi/mi^2).
    c. Proportion of Level 3-5 roads that occurs in the riparian reserve.

Relative Ranking. Based on the above information rank the watershed and Level 3-5 roads as follows:

a. Low (2) – low potential to restore riparian habitat and habitat connectivity.
b. Moderate (6) – moderate potential to restore riparian habitat and habitat connectivity.
c. High (10) – high potential to restore riparian habitat and habitat connectivity.
d. None (0) – road not located in a riparian reserve.

Criterion 4. Ungulates

This group of species includes mule deer, elk, mountain goats and bighorn sheep. Road-associated factors that could affect these species include hunting, poaching, collisions, movement barriers, displacement/avoidance, habitat loss and fragmentation (USDA FS 1997, Singleton and Lehmkuhl 1998, Canfield et al. 1999, Wisdom et al. 1999).

This analysis addresses, in part, terrestrial wildlife roads analysis questions TW (1), TW (2), and TW (3) identified in Roads Analysis: Informing Decisions about Managing the National Forest Transportation System (USDA FS1999).

Questions Addressed

1. Direct effects on terrestrial species habitat (TW – 1)
2. Affects to habitat by facilitating human activities (TW – 2)
3. Affect to legal and illegal human activities i.e. trapping, hunting, poaching (TW – 3)

Ratings

1. Analysis Area: The watersheds within the sub-basin.
2. Determine the proportion and area of winter ranges, young rearing areas, and migration routes for these ungulate species within each watershed.
3. Identify the issues and priorities for further analysis and Level 3-5 road restoration opportunities based on the following:
    a. Proportion and area of the winter range, young rearing areas, and migration routes in each watershed.
    b. Density of roads (high = >2mi/mi^2, moderate = 1-2mi/mi^2, and low = <1 mi/mi^2) within these areas, based on the assumption that road density is a good indicator of snowmobile/winter use.

c. Potential of the Level 3-5 road to enhance winter range, based on actual winter range and not EW (1), young rearing areas and migration routes through a management action.

4. Relative Ranking. Based on the above information rank the Level 3-5 roads and watershed as follows:
   a. Low (1) – low potential to enhance habitat effectiveness of winter ranges, young rearing areas and migration routes.
   b. Moderate (5) – moderate potential to enhance the habitat effectiveness of winter ranges, young rearing areas and migration routes.
   c. High (9) – high potential to enhance habitat effectiveness of winter ranges, young rearing areas and migration routes
   d. None (0) - not located on winter range, young rearing area or migration route for ungulates.

Criterion 5. Unique Habitats

Unique habitats include wetlands, talus slopes, caves, cliffs, snag patches, hardwood forests, etc. These habitats tend to be used disproportionate to their availability on a landscape, making them particularly important for wildlife and greatly enhancing biodiversity. Road-associated factors that could affect the wildlife species associated with these habitats include collisions, movement barriers, displacement/avoidance, habitat loss and fragmentation (USDA FS 1997, Singleton and Lehmkuhl 1998, Wisdom et al. 1999).

This analysis addresses terrestrial wildlife roads analysis question TW (4) identified in Roads Analysis: Informing Decisions about Managing the National Forest Transportation System (USDA FS1999).

Questions Answered

Affects of unique communities or special features (AW–4)

Rating

1. The Analysis Area: the watersheds within the sub-basin.
2. Identify the unique habitats within each watershed.
3. Identify the issues and priorities for further analysis, and Level 3-5 road restoration opportunities based on the following:
   a. The density of unique habitats (acres/mile road within 100m of Level 3-5 road) within the watershed.
   b. The quantity of unique habitats (number of unique habitat types/road segment or road within 100m of Level 3-5 roads).
   c. Rating of unique habitats will be based on the following formula and then applied to relative ranking below:
      1) Low density + low quantity = low
      2) Low/moderate density + moderate quantity = moderate
      3) Moderate density + low/moderate quantity = moderate
      4) High/moderate density + high quantity = high

5) High density + high/moderate quantity = high
   Determination of low/mod/high density and quantity will be a function of statistical distribution and ecological situation specific to each sub-basin.

4. Relative Ranking. Based on the above information rank the watershed as follows:
   a. Low (2) – low density/quantity of unique habitats and low potential to restore unique habitats.
   b. Moderate (6) – moderate density/quantity of unique habitats and moderate potential to restore unique habitats.
   c. High (10) – high density/quantity of unique habitats and high potential to restore unique habitats.
   d. None (0) – Level 3-5 road does not affect unique habitats.

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Table C-3: Wildlife impact, at-risk, Naches Sub-Basin

Road seg. #	FS rd #	Seg. length	Wide-range carnivores	Late success. species	Riparian dependent	Ungulates	Unique habitats	Wildlife total	Wildlife rating
1	1000000	13.5	5	10	2	1	2	20	M
2	1010000	3.8	9	10	6	1	0	26	H
3	1040000	5.7	5	10	2	1	0	18	M
4	1050000	5	9	10	10	0	2	31	H
5	1070000	4.4	5	2	2	0	6	15	M
6	1200000	17.4	5	2	2	5	6	20	M
7	1200530	4.4	1	6	2	0	2	11	M
8	1200570	2.8	5	6	2	9	0	22	H
9	1200711	3.9	1	0	6	0	6	13	M
10	1200740	1.8	1	0	2	0	0	3	L
11	1201000	7.6	5	10	2	9	6	32	H
12	1202000	3.4	9	10	6	0	6	31	H
13	1202000	6.7	5	2	2	9	6	24	H
14	1203000	2.5	5	2	2	5	2	16	M
15	1204000	10	5	6	2	5	6	24	H
16	1205000	3.1	9	2	2	5	6	24	H
17	1205000	3.5	5	2	2	5	6	20	M
18	1205742	0.2	1	2	2	0	0	5	L
19	1207000	4.9	5	6	2	1	2	16	M
20	1241000	4.3	1	0	0	5	0	6	L
21	1302000	12.5	5	2	2	9	10	28	H
22	1306000	3.8	9	10	6	5	2	32	H
23	1308000	2.8	1	2	6	1	2	12	M
24	1400000	12.8	5	0	6	9	10	30	H
25	1400000	1.6	9	0	2	0	10	21	H
26	1400235	1.7	1	0	6	5	6	18	M

Road seg. #	FS rd #	Seg. length	Wide-range carnivores	Late success. species	Riparian dependent	Ungulates	Unique habitats	Wildlife total	Wildlife rating
27	1401000	7.8	5	0	10	9	6	30	H
28	1500000	25	1	6	2	9	10	28	H
28a	1500000®		1	6	2	9	10	28	H
29	1500190	2.7	5	2	2	9	10	28	H
30	1500199	2.1	5	2	2	1	10	20	M
31	1500312	2	1	0	2	9	0	12	M
32	1500315	0.2	1	0	6	5	0	12	M
33	1501000	10.3	9	10	10	9	6	44	H
34	1502000	7.2	5	0	2	9	6	22	H
35	1503000	7.8	9	0	2	5	0	16	M
36	1504000	2.8	5	0	2	0	6	13	M
37	1600000	12.4	5	10	10	9	6	40	H
38	1600000	6.1	9	2	2	0	6	19	M
39	1601000	9.2	9	5	6	9	6	35	H
40	1603000	3.9	9	2	2	9	0	22	H
41	1605000	9.5	9	10	2	5	2	28	H
42	1607000	3.5	9	2	6	1	0	18	M
43	1611000	8.3	9	10	10	9	6	44	H
44	1701000	8.6	5	0	2	9	10	26	H
45	1701000	7.8	9	0	2	0	10	21	H
46	1702000	3.7	5	0	6	9	10	30	H
47	1702000	8.3	9	0	6	5	10	30	H
48	1703000	10	5	2	10	9	6	32	H
49	1704000	2.8	1	2	10	0	0	13	M
50	1704311	1.2	1	2	10	0	0	13	M
51	1705000	4.8	5	2	2	5	0	14	M
52	1706000	0.4	1	2	2	0	2	7	L

Road seg. #	FS rd #	Seg. length	Wide-range carnivores	Late success. species	Riparian dependent	Ungulates	Unique habitats	Wildlife total	Wildlife rating
53	1706000	8.8	5	2	2	5	2	16	M
54	1706200	0.8	1	0	2	1	6	10	M
55	1707000	6.4	9	6	2	5	6	28	H
56	1708000	10.6	9	10	10	5	6	40	H
57	1709000	8.6	5	10	2	5	6	28	H
58	1709300	2.2	1	2	10	0	0	13	M
59	1712000	4.7	9	0	0	9	10	28	H
60	1720000	5.2	5	0	6	1	10	22	H
61	1800000	10.9	1	2	10	5	6	24	H
62	1800000	7.1	5	6	2	0	6	19	M
63	1808000	3.6	5	6	2	0	2	15	M
64	1900000	14.5	1	10	6	5	6	28	H
65	1900000	2.9	9	10	2	0	6	27	H
66	1901000	5.9	9	10	6	0	0	25	H
67	1901000	4.4	5	6	2	5	0	18	M
68	1902000	14.3	5	10	2	5	6	28	H
69	1902865	0.5	1	0	0	0	0	1	L
70	1902866	0.2	1	0	0	0	10	11	M
71	1903000	2.2	5	0	6	0	0	11	M
72	1906000	4.8	9	0	10	1	2	22	H
73	1911000	6.7	9	6	10	0	2	27	H
74	1913000	1.6	5	6	10	0	10	31	H
75	1920000	10.1	9	6	2	0	0	17	M

Table C-4. Results of roads analysis, rating and notes, for wildlife habitat on Naches Sub-Basin

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
1	1000000	13.5	5	10	2	1	2	20	M	WRC-Moderate level road(rd) density (RD) for watershed, potential to improve but only mod.; L-bisects Tieton LSR; R-RD within riparian reserve= 2.8, high, most on edge or above rip.; U-Transition (T)
2	1010000	3.8	9	10	6	1	0	26	H	WRC-same watershed(WS), mod, higher potential to improve core; L-bisects Tie. LSR; R-2+crossings, possible prob.; U- T
3	1040000	5.7	5	10	2	1	0	18	M	WRC-sandwiched between 2 road sys., runs parallel to 1000; U- T
4	1050000	5	9	10	10	0	2	31	H	WRC-sim. To 1010, currently phys. Closed, "slumped out"; R-already slumped closed and sloughing into river
5	1070000	4.4	5	2	2	0	6	15	M	WRC-accesses state, res and priv. land, therefore leave as mod.; L-on edge of Tie. LSR boundary
6	1200000	17.4	5	2	2	5	6	20	M	WRC-main rd around Rimrock Lk., lots of recc. use, homes, trailhead(TH); L-skirts Tie. LSR boundary; R-stretch that follows Bear Ck., but paved.; U- T, calving (C), fawning (F)
7	1200530	4.4	1	6	2	0	2	11	M	WRC-possibly Upper Tie., Rd. dens low=0.5, comes off 1200 w/high rec. Use, watershed already in pretty good shape, near HWY 12, so could increase to mod.; R-not much in habitat.

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
8	1200570	2.8	5	6	2	9	0	22	H	WRC-Tie. H20shed, high use, lots of trails, lots of rds. Near district bound. L-no LSR habitat and little/short but… R-not much in habitat.; U-narrow band of winter range
10	1200740	1.8	1	0	2	0	0	3	L	WRC-rd. between Tie. WS, accesses campgr.
11	1201000	7.6	5	10	2	9	6	32	H	WRC-ties into 570; L-bisects Lost Lake MLSA; R-good shape; U-bisects winter range (WR)
12	1202000	3.4	5	2	2	9	6	24	H	WRC-breaks because of maintenance level, LSR, closed because of slump approx. 1/2 way up; L-in Tie. LSR.; R-lots of wetspots, lg. grazing, ungulate issue; U- small section of road (lower 1/3) in winter range
13	1202000	6.7	9	10	6	0	6	31	H	WRC-from 6.7 miles on rate a 9; L-in Tie. LSR, R-steeper, slumped
14	1203000	2.5	5	2	2	5	2	16	M	WRC-ties into 1202 from 1200; L-in lower Tie. LSR.; R-problem with beaver on lower end; U- T,C,F
15	1204000	10	5	6	2	5	6	24	H	WRC-goes up on Pine Grass Ridge, goes to wilderness bound. starts as mod, wilderness access; in Tie. LSR, starting into high elev.; U- transition (T) habitat, potential calving (C) and fawning(F)
16	1205000	3.1	5	2	2	5	6	20	M	WRC-joins into 1204, same story; L-glances off Tie. LSR boundary.; U-transition (T) habitat, potential calving (C) and fawning(F)

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
17	1205000	3.5	9	2	2	5	6	24	H	WRC-does not go to TH; L-glances off Tie. LSR boundary.; U- transition (T) habitat, potential calving (C) and fawning(F)
18	1205742	0.2	1	2	2	0	0	5	H	WRC-does not go to TH; L-glances off Tie. LSR boundary.; U- transition (T) habitat, potential calving (C) and fawning(F)
19	1207000	4.9	5	6	2	1	2	16	M	WRC-CG, TH to wilderness, Rd. dens is low, rate 5 because only a rd. for 3 miles.; L-finger of Tie. LSR surrounded by wilderness; R-most part out of main drain., intersects some; U- T
20	1241000	4.3	1	0	0	5	0	6	L	WRC-sandwiched; R-doesn't appear to intersect anything; U- transition (T) habitat, potential calving (C) and fawning(F)
21	1302000	12.5	5	2	2	9	10	28	H	WRC-comes off HWY 12, "Jump Off", goes thru winter range(ungulates) and prv., some potential, although used some lateral spurs benefit from close.; L-upper end in Lost Lake MLSA; R-outside of drain. at ridge top; U- right thru middle of WR
22	1306000	3.8	9	10	6	5	2	32	H	WRC-in MSLA, goes into Wildcat Drain., adj. to wilderness, TH @ end, use?, lots of trib. rds.; L-goes right thru Russel Ridge MLSA,; R-some problem places; U- WR, T, C, F
23	1308000	2.8	1	2	6	1	2	12	M	WRC-Indian Ck., mostly upper Tie., major TH, low RD; L-small piece in Tie. LSR; R-some problem places, bull

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
										trout stronghold; U- T
24	1400000	12.8	5	0	6	9	10	30	H	WRC-Oak Ck. WS, mod RD=5, mixed St., Prv land, state wants closure; R-a few pieces could stand improvement; U- right thru middle of WR
25	1400000	1.6	9	0	2	0	10	21	H	WRC-goes to ridge top, jeep trail; R-on ridge top; U- not in WR
26	1400235	1.7	1	0	6	5	6	18	M	WRC-Oak Ck. WS, very short but goes to high use fishing lakes, maybe 1 because wouldn't get much ben.; R-some places around lake are trashed; U-in smaller piece then outside of WR
27	1401000	7.8	5	0	6	9	6	26	H	WRC-accesses ridge top, will impact ungulates, mixed ownership; R-in channel in places; U- runs thru middle of WR
28	1500000	25	1	6	2	9	10	28	H	WRC-splits Tie & Rattle., bulk in Ratt., RD for Ratt is low, main travel rte.; L-Rattlesnake LSR, n/c.; R-outside major; U- WR on both ends, high elev. in middle.
28a	1500000r	0	1	6	2	9	10	28	H	Same
29	1500190	2.7	5	2	2	9	10	28	H	WRC goes to Timberwolf, close to Wilderness, Old lookout, popular with tourists, high potential but maybe not for carnivores. Key deer, elk and mtn. Goats; L-in Ratt. LSR but high elevation non-hab.; R-goes by some wet spots;U-both WR & other key big game range (goats)

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
30	1500199	2.1	5	2	2	9	10	20	M	WRC-on ridge top, TH; L-n Ratt. LSR but High elevation, non-habitat; U-T
31	1500312	2	1	0	2	9	0	12	M	WRC-Rd to Tieton Pond, lots of recc. use, R-some opp. depend. on elev., most outside rip.; U- bisects WR
32	1500315	0.2	1	0	6	5	0	12	M	WRC-to Tie. Pond; R-mod. to control traffic; U- tiny spur in WR
33	1501000	10.3	9	10	10	9	6	44	H	WRC-would increase core substantially; L-bisects Rattlesnake LSR; R-"up the gut"; U- T,F,C
34	1502000	7.2	5	0	2	9	6	22	H	WRC-Daniel Lk. TH, high use fish, recc.; R-not too bad; U- right thru mid. WR & transition(T), fawning(F) and calving(C)
35	1503000	7.8	9	0	2	5	0	16	M	WRC-ties 1501/1500, could increase core; U-lower part is def. WR, then gets outside.
36	1504000	2.8	5	0	2	0	6	13	M	WRC-doesn't go anywhere, but not much to be gained
37	1600000	12.4	5	10	10	9	6	40	H	WRC-high RD, main rd, lots of pot. but many arterials; L-bisects Haystack MLSA; R-really high RD, parts in channel; U- bisects WR
38	1600000	6.1	9	2	2	0	6	19	M	WRC-popular but good potential; L-on periphery of Haystack MLSA
39	1601000	9.2	9	6	6	9	6	36	H	WRC-ravine, bulk of rd. in Mainstem WS; L-on Haystack LSR edge; R-most high on ridge, few prob. spots.; U-bisects WR
40	1603000	3.9	9	2	2	9	0	22	H	WRC-n/c; L- through sliver of Haystack MLSA; R-not really in hab.; U- bisects WR

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
41	1605000	9.5	9	10	2	5	2	28	H	WRC-"definitely 9"; L-bisects upper Nile LSR; R-not really in hab.; U- T,C,F
42	1607000	3.5	9	2	6	1	0	18	M	WRC-any laterals to 1600=9, take out greatly increase core; L- through sliver of Haystack MLSA; R-few spots; U- T
43	1611000	8.3	9	10	10	9	6	44	H	WRC-n/c; L-bisects Haystack MLSA, periphery Upper Nile; R-right up gut; U-WR, T, C, F
44	1701000	8.6	5	0	2	9	10	26	H	WRC-other side of MS, Benton Ck., mixed owner.; R-prob. not too bad with a few exceptions; U- goes thru WR
45	1701000	7.8	9	0	2	0	10	21	H	WRC-splits maint.level, upper piece = 9 but have to deal with priv. access, goes into wilderness; R-mostly on ridge
46	1702000	3.7	5	0	6	9	10	30	H	WRC-same reason as above; U- goes thru WR
47	1702000	8.3	9	0	6	5	10	30	H	WRC-same reason as above
48	1703000	10	5	2	10	9	6	32	H	WRC-Gold Ck., goes up into mixed owner. (prv.) township, ie. 1701; L-little piece in Upper Nile LSR?, R-in creek; U- bisects WR
49	1704000	2.8	1	2	10	0	0	13	M	WRC-Old R. Rd., parallels HWY, homes, priv.; L-in Haystack MLSA, not much to be done.; R-goes thru rip.
50	1704311	1.2	1	2	10	0	0	13	M	WRC-accesses Church Camp; L-in Haystack MLSA, not much to be done.; R-some probs., "perpetual headache"
51	1705000	4.8	5	2	2	5	0	14	M	WRC-Spring Ck. comes back to 1703; L-little piece in Upper Nile LSR?; R-in good shape; U- C,F
52	1706000	0.4	1	2	2	0	2	7	L	WRC-paved; L-on edge of Mill Ck. MLSA;

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
53	1706000	8.8	5	2	2	5	2	16	M	WRC-ties into 1600 Rd, loop, consistent with 1600; L-on edge of Mill Ck. MLSA; U- C, F
54	1706200	0.8	1	0	2	1	6	10	M	WRC-rd. to Boulder Cave, paved; R-not much potential
55	1707000	6.4	9	6	2	5	6	28	H	WRC-Pine Ck., Rd is closed @ switchback, have to access "long way", fair amt. of tributary, sandwiched but potential to increase core because closed at bottom. Does access some popular dispersed sites.; L-off 1708 in Mill Ck. MLSA; U- C, F
56	1708000	10.6	9	10	10	5	6	40	H	WRC-goes into headwaters and priv. but extends quite a way at upper end.; L-splits Mill Ck. MLSA on 1 side.; R- up gut of creek; U- T
57	1709000	8.6	5	10	2	5	6	28	H	WRC-loop into 1706; L-in/out of Mill Ck. MLSA, ties into 1706; R-not much riparian; U-T, C, F
58	1709300	2.2	1	2	10			13	M	WRC – access dispersed use, not mmuch potential; L – short spur in Mill Creek. MLSA; R-backside of R?
59	1712000	4.7	9	0	0	9	10	28	H	WRC-in MS, SE end, on winter range, ridge top, accesses State land; R-ridge top
60	1720000	5.2	5	0	6	1	10	22	H	WRC-main haul rte.; R-some areas
61	1800000	10.9	1	2	10	5	6	24	H	WRC-low RD, county maintains, accesses wilderness, TH, CG;L-in Bumping LSR, surrounded by wilderness, low; R-a lot in or adj. to rip.; U- lower, plowed

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
62	1800000	7.1	5	6	2	0	6	19	M	WRC-same; L-little higher potential than lower piece.; R-most stays out.
63	1808000	3.6	5	6	2	0	2	15	M	WRC-same access issues, (RD may be higher due to Plum Ck. Rds. Assume high on checkerboard land.; L-in Bumping LSR, some potential; R- most stays out.
64	1900000	14.5	1	10	6	5	6	28	H	WRC-main access, paved; R- some pot.; U- T, C, F
65	1900000	2.9	9	10	2	0	6	27	H	WRC-not paved, no real access.; R-not much
66	1901000	5.9	5	6	2	5	0	18	H	WRC-n/c; U- C,F
67	1901000	4.4	9	10	6	0	0	25	M	WRC-n/c; L-upper part bisects Manastash Ridge LSR
68	1902000	14.3	5	10	2	5	6	28	H	WRC-Raven's Roost, TH, microwave tower, potential but low likelihood; L-in Crow MLSA, "being consistent"; R-just a few opp.; U- C, F
69	1902865	0.5	1	0	0	0	0	1	L	WRC-short spur, won't buy a lot; R-high elev.
70	1902866	0.2	1	0	0	0	10	11	M	WRC-same as 865
71	1903000	2.2	5	0	6	0	0	11	M	WRC-ties into 1901; R- some habitat opp.
72	1906000	4.8	9	0	10	1	2	22	H	WRC-S.Fk. Naches, could gain a big chunk of core, not much access; R- some stretches right in rip.
73	1911000	6.7	9	6	10	0	2	27	H	WRC-accesses Plum Ck., could get them to gate/close; L-in Manastash Ridge LSR, in Plum Ck. checkerboard.; R- gets into rip.

Road seg. #	FS rd. #	Seg. length	Wide-range carniv.	Late success. species	Riparian depend.	Ungulates	Unique habitats	Wildlife total	Wildlife rating	Notes
74	1913000	1.6	5	6	10	0	10	31	H	WRC-Plum Ck. manages as closed with gate, although forget to close sometimes; L-in Manastash Ridge LSR, in Plum Ck. checkerboard.; R- crosses a couple of times, some sites need work
75	1920000	10.1	9	6	2	0	0	17	M	WRC-accesses ridge top; L-Cuts Crow MLSA; R- gets up on ridge quickly

Appendix D: Recommended Management Actions

Recommended Management Actions are a group of alternatives that are possible options to meet the needs of the resources and the public. Any single action or combination of actions could be used. This analysis will give the broad category and the district will need to decide which actions are appropriate for each project.

A. Access needs to be maintained due to public needs, however some major work or restrictions are needed to mitigate the resource impacts. Options include but are NOT limited to: relocation, major rehabilitation such as raising grade, surfacing, installing a large CMP or bridge, major storm proofing (investment needed, time & money).

B. Access needs to be maintained due to public needs, however some minor work or restrictions are needed to mitigate the resource impacts. Options include but are NOT limited to: seasonal restrictions or gating entrance, minor ditch work, adding small CMP, improved or more frequent maintenance, minor storm proofing (only enough work to address critical rating element).

C. Due to limited access needed and minimal resource impacts, these are candidates to leave as is, maintenance continues as is.

D. Access needs to be maintained due to limited public or resource needs and there are few or no resource impacts, so it would be possible to reduce the maintenance level.

E. Access may be available but due to budget constraints and minimal resource impacts, these are candidates to stop maintaining after putting in a self-maintaining status.

F. Access does not need to be maintained and some form of decommission to provide ecosystem restoration would mitigate resources impacts. Options include but are NOT limited to: blocking the entrance (includes gating for other than annual type seasonal use), rip & seed, removing culverts, partial or full obliteration.

Quandary – This is for segments when there is conflicting management recommendations.

Resolve all possible recommendations within the team. All quandaries: write up why it is a quandary and present to line officer. Also provide short write up for each priority project, include: description, location, short and long term alternatives if needed.

Table D-1. Ratings and recommended management actions, alternatives

Aquatic rating	Wildlife rating	Human use rating	Recommended mgmt.
High	High	High	A
High or Moderate	High or Moderate	Low	E
Moderate	Moderate	Moderate	Quandary

Low or Moderate	Low or Moderate	High	B or D
Low	Low	Moderate	C
Low	Low	Low	D or E
High	Low or Moderate	High	A
Low or Moderate	High	High	A

Table D-2. Roads analysis recommended management actions, Naches Sub-Basin

Road seg. #	Watershed	FS rd #	Seg. length	Aquatic rating	Wildlife rating	Human use rating	Draft recomd mgmt.	Current maint. level	Current maint. cost	Proposed maint. level	Cost to maint.	Final recomd mgmt.	Priority - Remarks
1	Tieton	1000000	13.5	M	M	H	C	3	51300	3	51300	C	
2	Tieton	1010000	3.8	M	H	M	D	3	14440	2	3838	D	Mitigate sedimentation
3	Tieton	1040000	5.7	H	M	L	F	2	5757	0	0	A/F	Sedimentation from slide; No need after Smokey T.S.
4	Tieton	1050000	5	H	H	M	F	2	5050	0	0	A/F	Portions become 4X4 trail
5	Tieton	1070000	4.4	L	M	H	C	2	4444	2	4444	C	
6	Upper Tieton	1200000	17.4	L	M	H	C	5	0	5	0	C	County Road
7	Upper Tieton	1200530	4.4	L	M	M	C	3	16720	3	16720	C	
8	Tieton	1200570	2.8	M	H	H	B	3	10640	3	10640	B	Winter seasonal closure-wildlife wintering area
9	Tieton	1200711	3.9	M	M	H	B	3	14820	3	14820	B	Eliminate riparian/meadow access
10	Upper Tieton	1200740	1.8	L	L	H	B	3	6840	4	4140	B	Dust mitigation/Air quality
11	Tieton	1201000	7.6	L	H	H	C	3	28880	3	28880	C	
12	Tieton	1202000	3.4	H	H	H	A	3	12920	3	12920	A	Drainage work/reconstruction
13	Tieton	1202000	6.7	H	H	L	F	2	6767	0	0	F	No need/aquatic impact
14	Tieton	1203000	2.5	M	M	H	C	3	9500	3	9500	C	
15	Tieton	1204000	10	L	H	M	C	3	38000	3	38000	C	High day use
16	Tieton	1205000	3.1	M	H	M	B	3	11780	3	11780	B	Ditch relief on grade
17	Tieton	1205000	3.5	L	M	L	C	2	3535	2	3535	C	
18	Tieton	1205742	0.2	L	L	M	C	3	760	3	760	C	
19	Upper	1207000	4.9	M	M	M	A	3	18620	3	18620	A	Improve stream crossing

Road seg. #	Watershed	FS rd #	Seg. length	Aquatic rating	Wildlife rating	Human use rating	Draft recomd mgmt.	Current maint. level	Current maint. cost	Proposed maint. level	Cost to maint.	Final recomd mgmt.	Priority - Remarks
	Tieton												
20	Tieton	1241000	4.3	L	L	M	C	3	16340	3	16340	C	
21	Tieton	1302000	12.5	L	H	H	C	2	12625	2	12625	C	
22	Tieton	1306000	3.8	H	H	H	A	3	14440	3	14440	A	Relocate trailhead/reconstruction
23	Tieton	1308000	2.8	H	M	M	A	3	10640	3	10640	A	Consider trailhead relocation
24	Oak Creek	1400000	12.8	L	H	H	C	3	48640	3	48640	C	Current seasonal winter closure
25	Oak Creek	1400000	1.6	L	H	H	B	2	1616	2	1616	B	Consider gate for all season closure/Wildlife
26	Oak Creek	1400235	1.7	L	M	H	C	3	6460	3	6460	C	
27	Oak Creek	1401000	7.8	H	H	H	A	2	7878	2	17940	A	Relocation
28	Tieton	1500000	25	L	H	H	C	3	95000	3	95000	C	
28a	Rattlesnake	1500000 ®	0	M	H	H	C	3	0	3	0	C	
29	Rattlesnake	1500190	2.7	L	H	M	D	3	10260	2	2727	D	Try to correct state motor route brochure?
30	Rattlesnake	1500199	2.1	L	M	M	D	3	7980	2	2121	D	
31	Tieton	1500312	2	L	M	H	C	3	7600	3	7600	C	
32	Tieton	1500315	0.2	L	M	H	C	3	760	3	760	C	
33	Ratltlesnake	1501000	10.3	H	H	H	C/D	3	39140	3/2	27740	C/D	Lower maintenance level to "2" after 1503 intersection (mp 5.5)
34	Rattlesnake	1502000	7.2	L	H	H	C	3	27360	3	27360	C	
35	Rattlesnake	1503000	7.8	L	M	H	C	3	29640	3	29640	C	
36	Rattlesnake	1504000	2.8	L	M	M	D	3	10640	2	2828	D	

Road seg. #	Watershed	FS rd #	Seg. length	Aquatic rating	Wildlife rating	Human use rating	Draft recomd mgmt.	Current maint. level	Current maint. cost	Proposed maint. level	Cost to maint.	Final recomd mgmt.	Priority - Remarks
37	Main Stem	1600000	12.4	M	H	H	C	3	47120	3	47120	C	
38	Mainstem	1600000	6.1	L	M	H	C	2	6161	2	6161	C	
39	Rattlesnake	1601000	9.2	H	H	H	C	2	9292	2	9292	C	
40	Mainstem	1603000	3.9	L	H	M	C	2	3939	2	3939	C	
41	Mainstem	1605000	9.5	L	H	M	B	2	9595	2	9595	B	Minor drainage work above ford
42	Mainstem	1607000	3.5	L	M	M	C	2	3535	2	3535	C	
43	Mainstem	1611000	8.3	H	H	H	A	2	8383	2	8383	A	Larger Arch above first crossing/look at relocation
44	Mainstem	1701000	8.6	L	H	H	C	3	32680	3	32680	C	
45	Mainstem	1701000	7.8	L	H	H	C	2	7878	2	7878	C	
46	Mainstem	1702000	3.7	H	H	H	C	3	14060	3	14060	C	
47	Mainstem	1702000	8.3	L	H	H	C	2	8383	2	8383	C	
48	Mainstem	1703000	10	M	H	H	C/D	3	38000	3/2	25440	C/D	Culvert/fish passage on Gold Creek,Level 2 from 1705 intersection above (mp5.5)
49	Mainstem	1704000	2.8	M	M	H	C	3	10640	3	10640	C	
50	Mainstem	1704311	1.2	H	M	M	B	3	4560	3	4560	B	Lost Creek culvert fish passage/slope into river/Dust abatement
51	Mainstem	1705000	4.8	L	M	H	C	3	18240	3	18240	C	
52	Mainstem	1706000	0.4	L	L	H	C	4	920	4	920	C	
53	Mainstem	1706000	8.8	L	M	H	C	3	33440	3	33440	C	
54	Mainstem	1706200	0.8	M	M	M	B	4	1840	4	1840	B	Swamp Creek culvert fish passage
55	Mainstem	1707000	6.4	M	H	M	D	3	24320	2	6464	D	Possible traffic controls around wet meadows/Close lower

Road seg. #	Watershed	FS rd #	Seg. length	Aquatic rating	Wildlife rating	Human use rating	Draft recomd mgmt.	Current maint. level	Current maint. cost	Proposed maint. level	Cost to maint.	Final recomd mgmt.	Priority - Remarks
													section
56	Mainstem	1708000	10.6	H	H	H	A	3	40280	3	40280	A	Traffic control to upper meadows/stability issues upper end
57	Mainstem	1709000	8.6	L	H	H	C	3	32680	3	32680	C	
58	Mainstem	1709300	2.2	H	M	H	B	3	8360	3	8360	B	Fill slopes into river/riparian access
59	Mainstem	1712000	4.7	L	H	M	E	2	4747	1	10810	E	Leave as is
60	Mainstem	1720000	5.2	L	H	H	C	3	19760	3	19760	C	
61	Bumping	1800000	10.9	H	H	H	C	5	0	5	0	C	County Road
62	Bumping	1800000	7.1	L	M	L	C	3	26980	3	26980	C	
63	Bumping	1808000	3.6	H	M	M	B	3	13680	3	13680	B	Look at drainage into side channels
64	Lt. Naches	1900000	14.5	H	H	H	B	4	33350	4	33350	B	Horsetail Falls, Jungle Creek Culverts
65	Lt. Naches	1900000	2.9	L	H	H	C	2	2929	2	2929	C	
66	Lt. Naches	1901000	5.9	L	H	H	C/D	3	22420	3/2	11820	C/D	Level 2 above 1903 intersection/consider ditch relief
67	Lt. Naches	1901000	4.4	L	M	L	C	2	4444	2	4444	C	
68	Lt. Naches	1902000	14.3	L	H	H	C	3	54340	3	54340	C	
69	Lt. Naches	1902865	0.5	L	L	L	D	3	1900	2	505	D	
70	Lt. Naches	1902866	0.2	L	M	M	C	3	760	3	760	C	
71	Lt. Naches	1903000	2.2	L	M	M	C	3	8360	3	8360	C	
72	Lt. Naches	1906000	4.8	M	H	M	D	3	18240	2	4848	D	
73	Lt. Naches	1911000	6.7	M	H	H	B	2	6767	2	6767	B	Cub Creek culvert/Look at bridge approaches
74	Lt. Naches	1913000	1.6	L	H	H	D	3	6080	2	1616	D	
75	Lt. Naches	1920000	10.1	L	M	H	D	3	38380	2	10201	D	

Appendix E: Public Input

Naches Ranger District

To obtain public comments, the Naches Ranger District sent over 500 letters out, held a public meeting and posted information on on a forest web site for all interested to participate. Approximately 45 people attended the meeting and 11 letters were returned with comments. The comments were reviewed during the analysis. From the information the following summary was developed. Additional information is included in Appendix E and returned letters and forms are available at District Ranger Stations.

The general feeling, based on comments from the public meeting and letters received to date, is that people want to see access maintained. They also want to see access for a variety of activities. Comments suggest that maintenance levels can be adjusted as long as access is not eliminated. Some comments were for a higher level of maintenance on certain roads and others stated they would like to see some roads gradually degraded to a lower maintenance standard. One comment emphasized consideration for disabled persons, another pointed out that access should not be limited to the "financially and physically elite," but should be available to all people.

Table E–1. Stakeholder comments

Significant issue	Stakeholder	Stakeholder position	Rationale for position	Unit of measure
Cost Share Road Agreement	Plum Creek Timber Company	Mainline roads must be maintained to the level in the agreement. Company relies on those agreements to due their activities. Further road maintenance will severely jeopardize operations.	Company relies on C/S agreements to perform their duties. Both parties accepted Road standards and maintenance levels in the agreement.	Road Segments
Greater awareness and care for the diverse uses is warranted	Bear Creek Cabin Owners	Level 3 – 5 roads should remain available. Some roads need more maintenance. Some are plowed of snow for snowmobiles. Some are not plowed well enough.	Stakeholder uses many of these roads for a variety of activities throughout the year.	Outdoor activities
Opposed to actions that would lead to road closures	Outdoor Recreationist	Downgrading of any of these public roads should not lead to closures.	"They should not be down graded if it could lead to future closures."	Roads
Maintenance level	Outdoor Recreationist	Roads 1205, 1204, 1200530, 1308, 1500199, 1500190, 1000, 1200, 1200740, 1241, 1010, 1201, 1207	These roads receive the type and amount of use to justify this level of maintenance.	Roads

Significant issue	Stakeholder	Stakeholder position	Rationale for position	Unit of measure
		maintenance warrant Level 3.		
Maintenance level	Outdoor Recreationist	Trailhead should be added to road to Boot Jack to list of roads to be maintained for passenger cars.	This trailhead should not be limited to certain classes of vehicles.	Roads
Road Maintenance	Local Resident and recreationist	Roads should be maintained for passenger vehicles. Keep present classification.	Persons with disabilities should be able to travel into forest.	Roads
Maintaining access and availability for all citizens	Past resident of area	Opportunities for multiple use need to be maintained.	"It would be inappropriate to lock up the National Forest for the young, financially and physicially fit members of society to exclusion of common citizens."	Forest
Controlling use of undesignated campgrounds	Interested Party	Roads that lead to undesignated campgrounds should be closed and blocked from use.	This would save road maintenance funds and would reduce the risk of human caused fires and reduce litter buildup.	Money savings
Road Maintenance	Interested Party	Would like to see all roads open, let the self-destruct unless a real safety hazard.	Why spend money where not needed	Money saving
Road Maintenance	Interested Party	Maintain all roads accessing all trailheads suitable for trailer travel, preferably at least Level 3	Need trailer access	Accessible for trailers
Fire Control	Interested Party	Widen road clearing of brush and trees on roads 1503, 1504, 11913	For fire control	Suitability for fire break

The following table lists the number of individuals who voted for specific raod segments to be maintained and open to passenger vehicles or open to high clearance vehicles.

Table E-2. Road comment summary

Road seg. #	FS road #	Maintain for passenger vehicles	Maintain for high clearance vehicles	Notes
1	1000	7 votes		Upgrade to Level 4 or 5
2	1010	2	4 votes	
3	1040	2	2	
4	1050	1	3	
5	1070		3	
6	1200	5		
7	1200530	2	5	Flat 3 rest 2
8	1200570	1	5	
9	1200711	5	1	
10	1200740	5	1	
11	1201	8	1	
12	1202	5	1	
13	1202	3	4	
14	1203	5	1	
15	1204	7	1	
16	1205	6	1	
17	1205	2	3	
18	1205742	2	2	
19	1207	7		
20	1241	3		
21	1302	1	2	
22	1306	5	1	
23	1308	5	2	
24	1400	5	1	
25	1400	4	1	
26	1400235	5	1	
27	1401	1	1	
28	1500	5		
29	1500190	2	5	
30	1500199	1	5	
31	1500312	4	2	
32	1500315	4	2	
33	1501	6		
34	7	1		3 to lake, then 2
35	1503	6	1	Widen-fire control
36	1504	6		Widen-fire control

Table E–2. Road comment summary

Road seg. #	FS road #	Maintain for passenger vehicles	Maintain for high clearance vehicles	Notes
37	1600	6		
38	1600	6	1	
39	1601	1	1	
40	1603	1	1	
41	1605	1	1	
42	1607	1	1	
43	1611	1	1	
44	1701	7		
45	1701	4	1	
46	1702	6		
47	1702	4	2	
48	1703	7	1	3 tp 1705 junction then 2
49	1704	6	1	
50	1704311	4	2	
51	1705	3		
52	1706	5		
53	1706	5	1	
54	1706200	1	1	
55	1707	6	1	
56	1708	7	1	3 to pond then 2
57	1709	6		
58	1709300	3	1	
59	1712	1	1	
60	1720	6		
61	1800	4		
62	1800	5	1	
63	1808	5	1	
64	1900	5		
65	1900	3	2	
66	1901	3	4	
67	1901	1	2	
68	1902	6	1	
69	1902865	1	2	
70	1902866	1	2	
71	1903	2	1	
72	1906	5	2	
73	1911	1	1	
74	1913	4	2	
75	1920	5	2	Widen-fire control

Interested Parties Public Involvement

The following is a list of interested parties. These individuals, agencies and organizations expressed interest either through attendance at public or agency meetings, or responded with comments.

A.J. Cloninger Jr.
D.R. Wolthausen
Lee Carlson
Neah Smith
Marcella Larson
James McCafferty
Dean Cook
Daniel Martinez
Mike Callahan
Jim Leier
Marty Ebert
Ed Lisowski
Doug Conner
Plum Creek Timber Co.
Jim Snell
Ernie Solowan
Greater Ecosystem Alliance
Charles West
John Hierholzer
Richard Siepman
R L Baxter
Pennis Ellsworth
Jim Kosko
Ted and Fran Filer
Jerry Chase
Denny Fear
Fran Macdonak
Tom Wilson
Lester George
Mary Van Amburg
Dan Boyle
Frank Freshusle
Lonnie Joslin
Ray Rose
Harry Melts
Raymond Johnson
WA Dept of Fish & Wldlf
Jeff Jones
Joseph Poore
Allen Rossman Jr
H James Logan
Yakima County Public Works
Roger Dinelensbeyer
Jim Cubberley
Jay Russell
Gale Grow
Al Hamilton
Jean M Lodge
Dan Kinney
Dan Wilcox
Ken Bevis
Don Jacobson
Roland Brain
Brian Offord
Mike Gorman
David Skinner
John McDonagh
Glen Miller
John Guruard III
John Talberth
Bruce & Jerry Dean Mercer
A G Woodall

Appendix F: Definitions

Definitions

Classified Road: Roads, wholly or partially within or adjacent to National Forest System lands, that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service.

Road: A vehicle travel-way more than 50 inches wide unless designated and managed as a trail. A road may be classified, unclassified, or temporary.

Road Decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Road Maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

Road Maintenance Levels:

1 - Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities.
2 - Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration.
3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.
4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Dust abatement is a consideration.
5 - Assigned to roads that provide a high degree of user comfort and convenience.

Road Reconstruction: Activities that result in improvements or realignment of an existing classified road.

Roads Subject to Highway Safety Act: National Forest System roads that are open to use by the public for standard passenger cars. This included roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use.

Temporary Roads: Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be part of the forest transportation system and not necessary for long-term resource management.

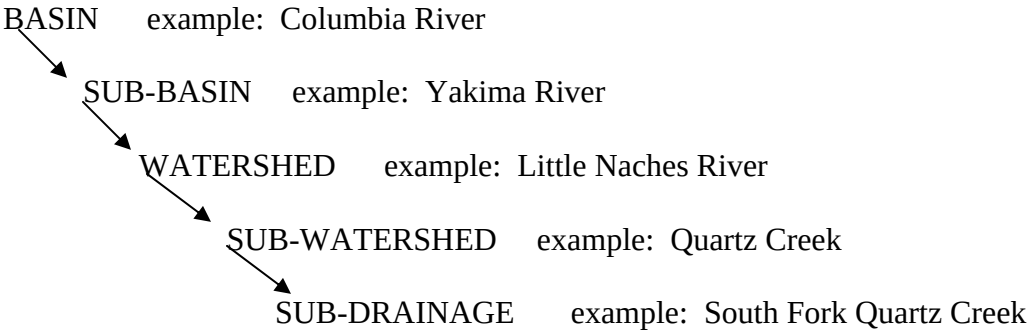
Unclassified Roads: Roads on National Forest System lands that are not managed as part of

the forest transportation system, such as unplanned roads, abandoned travel-ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorized and were not decommissioned upon the termination of the authorization.

Unroaded Areas (Roadless): Areas that do not contain classified roads.

Watershed Scale: A watershed is the area drained by a distinct stream or river system and separated from other similar systems by ridge top boundaries. Watersheds catch and store precipitation, releasing the stored water to the stream channel.

Watershed Hierarchy: The terms "watershed," "basin," "sub-basin," "sub-watershed," and "sub-drainage" are used to describe a hierarchy of "watershed." Areas that have been established by the Forest Service and other agencies. The hierarchy is as follows:



Terms Used in Wildlife Rating Criteria

Impassable road: Roads that are not reasonably or prudently passable by conventional four-wheeled passenger vehicles, motorcycles, or all terrain vehicles.

Open road: Roads open to motorized use during any portion of the season of concern for the particular species being addressed. If information is not available concerning the effectiveness of a gate or berm it may be best to assume it is open.

Restricted road: Roads that are legally restricted, typically with gates or berms and for which information is available showing that use does not exceed 14 days.